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# practical Wireless

MARCH 1992 £1.75

INSIDE THIS ISSUE

GREENWELD WINTER SUPPLEMENT

16 PAGE PULL-OUT CATALOGUE

**Constructional** Build A Capacitor Checker

**Reviewed** Vectronics VC300-DL Antenna Tuner and Icom IC-R7100 (withHF) Receiver

**Fred Judd G2BCX** Looks Into Transmission Line And SWR Power Loss

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Getting Started - The Practical Way

Special Offer, CB High & Low

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And Much, Much More

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- ✔ **Selectable Scan Skip:**
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- ✔ **One-Touch Instant Recall:**
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- ✔ **Priority Monitoring.**
- ✔ **Dual External Speaker Jacks:**
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- ✔ **Built-In Antenna Duplexers:**
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- ✔ **Reversed Masked Full Frequency LCD.**
- ✔ **8 Level Automatic Display/ Key Lighting Dimmer.**
- ✔ **Accessories Options:**
  FTS-22 (CTCSS Dual Decode Unit), FRC-4 (Pager Unit), DVS-3 (Voice Memory and Pager Unit), YSK-1L (6m Separation Kit Cable), SP-7 (External Speaker).

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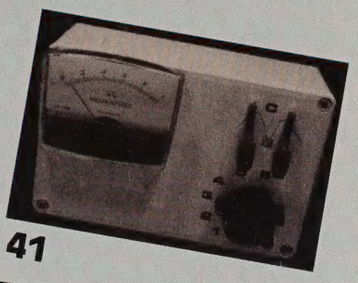

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Don't miss your flight to Dayton HamVention, see page 21 for more details.

SPECIAL OFFER
See page 69 for another PW offer.
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# Lee Electronics

## STANDARD EQUIPMENT

| | HAND HELD EQUIPMENT | Inc VAT £ |
|---|---|---|
| C528 | Dual band 144MHz/430MHz transceiver (extended coverage) | 379.00 |
| C150 | VHF FM 144MHz transceiver | 230.00 |
| C112 | VHF FM 144MHz mini transceiver | 230.00 |
| C412 | UHF FM 430MHz mini transceiver | 293.75 |
| C168 | VHF FM 144MHz miniature hand held transceiver | 269.00 |
| C468 | UHF FM 430MHz miniature hand held transceiver | 279.00 |
| C500ENB | Dual band 144MHz/430MHz transceiver** including CNB111 nicad battery | 335.000 |

### C150/C528 ACCESSORIES

| | | |
|---|---|---|
| CLC151 | Carrying case C150 with CNB151 Battery | 11.00 |
| CLC152 | Carrying case C150 with CNB152 battery | 11.50 |
| CLC528 | Carrying case C528 with CNB151 battery | 11.00 |
| CLC521 | Carrying case C528 with CNB152 battery | 11.50 |
| CMP111 | Speaker microphone | 35.25 |
| CMP113 | Tie-pin microphone | 29.38 |
| CMP115 | Speaker microphone (small size) | 34.08 |
| CMB111 | Mobile bracket | 10.58 |
| CMC150K | Mobile charger for CNB150/151/153 | 14.69 |
| CHP111 | Headset with P.T.T. switch | 34.00 |
| CNB151 | Nicad battery pack (7.2V - 700mAH) | 42.00 |
| CNB152 | Hi-power battery pack (12V - 600mAH) | 62.00 |
| CBT151 | Empty battery case for dry cells | 10.75 |
| CSA160E | Desk top rapid charger for C150/C528 (replaces CSA150) | 68.15 |
| CWC150 | AC charger CNB151 battery | 13.25 |
| CWC151 | AC charger CNB152 battery | 17.50 |
| CTN150 | CTCSS tone squelch unit | 46.00 |
| CTN520 | CTCSS tone squelch unit | 46.00 |
| CTD150 | DTMF unit for C500 | 35.75 |
| CAW150 | Power cable for mobile use | 6.15 |
| CAX02 | Battery contact covers | 4.11 |

### C164/468 ACCESSORIES

| | | |
|---|---|---|
| CAX03 | Button cover | 4.50 |
| CAX160 | Remote battery adaptor | 27.50 |
| CAW150 | Mobile power cable | 8.80 |
| CCA160 | Charging sleeve | 9.50 |
| CTN160 | CTCSS module | 46.00 |
| CMP111 | Standard size speaker/mic | 35.25 |
| CMP115 | Small speaker/mic | 34.08 |
| CHP111 | Headset boom mic | 34.00 |
| CMP113 | Tie-pin mic and earphone | 29.38 |
| CMB111 | Mobile bracket | 10.58 |

### MOBILE/FIXED EQUIPMENT

| | | |
|---|---|---|
| C5608D | Dual band UHF/VHF 45W mobile transceiver RX coverage 100MHz - 1GHz | 650.00 |

### C5608D ACCESSORIES

| | | |
|---|---|---|
| CAW560 | Dual microphone cable | 24.50 |
| CAW561 | 2 metre microphone extension cable | 15.50 |
| CAW562 | 4 metre microphone extension cable | 17.90 |
| CTN5680 | CTCSS tone squelch unit | 46.00 |
| CTD5680 | DTMF touch tone unit | 46.00 |
| TA208 | Slim-line extension speaker (4-8 OHMS/5W) | 13.50 |

### C112/412 ACCESSORIES

| | | |
|---|---|---|
| CLC412 | Carrying case | 10.75 |
| CMP111 | Speaker microphone | 35.25 |
| CMP113 | Tie-pin microphone | 29.38 |
| CMP115 | Speaker microphone (small size) | 34.08 |
| CMP111 | Mobile bracket | 10.58 |
| CNB412 | Nicad battery pack – Slim-line (7.2V - 400mAH) | 42.00 |
| CNB414 | Nicad battery pack (12V - 600mAH) | 62.00 |
| CWC150 | AC charger CNB412 battery | 14.00 |
| CCA412 | Charging adaptor | 9.70 |
| CSA160E | Desk top charger | 68.15 |
| CMA412 | Mobile adaptor | 19.95 |
| CKP412 | Keypad | 25.00 |
| CTD412 | DTMF unit | 46.00 |
| CTN412 | CTCSS tone squelch unit | 46.00 |

### C500 ACCESSORIES

| | | |
|---|---|---|
| CLC500 | Carrying case C500 with CNB111 battery | 11.00 |
| CLC501 | Carrying case C500 with CNB120 battery | 11.50 |
| CMP111 | Speaker microphone | 35.25 |
| CMP113 | Tie-pin microphone | 29.38 |
| CMP115 | Speaker microphone (small size) | 34.08 |
| CNB111 | Nicad battery pack (3.5W - VHF/3.0W - UHF) | 42.00 |
| CNB120 | Nicad battery pack (5W) | 57.50 |
| EBATT | Empty battery case for dry cells | 11.00 |
| CSA111 | Desk top charger CNB111 and CNB120 battery | 62.50 |
| C10/230-1 | Plug-in charger CNB111battery | 15.50 |
| CWC20 | Plug-in charger CNB120 battery | 16.30 |
| CAD111 | Charging adaptor for battery only | 8.50 |
| CAW120B | Mobile adaptor for direct use from car battery | 8.50 |
| CMC01 | Mobile charger car battery to CNB111 battery | 16.00 |
| CMB111 | Mobile bracket | 10.50 |
| CHP111 | Headset with P.T.T. switch | 34.00 |
| CTN500 | CTCSS tone squelch unit | 46.00 |
| CTD500 | Touch tone unit for use with remote control | 39.00 |

### C164/468 ACCESSORIES

| | | |
|---|---|---|
| CLC160 | Carry case for use with CNB160 | 11.75 |
| CLC161 | Carry case for use with CNB161 | 11.75 |
| CLC162 | Carry case for use with CNB162/163 | 11.75 |
| CNB160 | Nicad battery pack (6V @ 300ma) | 40.00 |
| CNB161 | Nicad battery pack (7.2V @ 700ma) | 43.00 |
| CNB162 | Nicad battery pack (12V @ 600ma) | 70.00 |
| CWC150K | Wall charger for CNB160/161/163 | 14.69 |
| CWC151K | Wall charger for CNB162 | 17.50 |
| CSA160E | Desk top rapid charger for all nicads | 68.15 |
| CAW150 | Mobile power supply cable | 6.15 |
| CMP150 | Headset with PTT/Vox | 45.00 |
| CMP160 | Memory unit - 30 channels | 15.00 |
| CMP161 | Memory unit - 200 channels | 18.50 |

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It seems a pity to supercede it, but that's progress for you!

The new model is still on the board and we hope to have some advanced info soon. The first **sample** model for the Japanese home market will be made available in Japan roundabout August but the **European** version sample will not be with us until Sept/Oct for evaluation and ordering against.

Deliveries, if all is well, should be some three weeks later, so keep an eye on the ads and we'll keep you updated.

**Norman**

## C528

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| 20089 9 el | 39.00 |
| 20822 11 el | 95.00 |
| 20813 13 el | 55.00 |
| 20817 17 el | 69.00 |
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| MFJ-106B | Dual time deck top clock. LCD Display | Phone |

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| PR-430 | 70cms 100 Watt 15db gain — 1.2db NF | 85.00 |

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| PC-110 | 10Amp 13.5V fully protected with meter | 89.00 |
| PT-120 | 20Amp 13.5V fully protected (non meter) | 119.00 |
| PC-120 | 20Amp 13.5V fully protected with meter | 149.00 |
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| R-50 | 2m 1-7W in 50W max out SSB/FM | 99.00 |
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| SR-200 | 2m 10-50W in 200W max out SSB/FM | 289.00 |
| VUR-30 | 2m/70cms 1-6W in 20/30W max FM | 229.00 |
| RU-20 | 70cms 0.8-3in 15-20W max out SSB/FM | 119.00 |
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| SX-200 | 1.8-200 MHz, 5.20-200 watts | 69.00 |
| SX-400 | 140-525 MHz, 5-20-200 watts | 79.00 |
| SX-600 | 1.8-525 MHz, 5.20-200 watts | 125.00 |
| SX-1000 | 1.8-1300 MHz, 5-20-200 watts | 165.00 |
| SX-2000 | 1.8-200 MHz, 5-20-200 watts AUTO | 95.00 |
| SX-9000 | 1.8-160 & 430-1300 MHz, AUTO | 190.00 |

#### BASE STATION ANTENNAS

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|---|---|---|
| CP-4 | 10-15-20-40m vertical with radials | 149.00 |
| CP-5 | 10-15-20-40-80m vertical with radials | 195.00 |
| CP-6 | 6-10-15-20-40-80M vertical with radials | 209.00 |
| D-130N | Discone 25-1300 MHz. 50 FT cable | 82.95 |
| CP-22E | 2m 2 X 5/8 6.5dB gain omni directional | 45.00 |
| D-707 | Active rx. 1.5-1300 MHz 12V | 99.00 |

#### FIBREGLASS VERTICALS

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|---|---|---|
| X-50 | 2m/70cms 4.5/7.2db gain 1.7m long | 59.95 |
| X-300 | 2m/70cms 6.5/9db gain 3.1m long | 95.00 |
| X-500 | 2m/70cms 8.3/11.7db gain 5.2m long | 119.00 |
| X-700 | 2m/70cms 9.3/13db gain 7.2m long | 219.00 |
| V-2000 | 6m/2m/70cms 2.15dbi/6.2db/8.4db 2.5m | 95.00 |
| X-5000 | 2m/70cms/23cms 4.5/8.3/1.7 db 1.8m | 109.00 |

#### MOBILE ANTENNAS AND MOUNTS

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| NR-2000M | 23cms/70cms/2m mobile whip PL259 | 49.95 |
| D-505 | Active rx. antenna 1.5-1300MHz 12v | 69.00 |
| NR-770R | 2m/70cms whip PL-259 | 35.00 |
| NR-790 | 2m/70cms 4.5/7.2 dB gain 100 Watts | 48.00 |
| SG-7900 | 2m/70cms whip 5.0/7.5 db supergainer | 68.00 |
| DP-2HE | 2m 1/4 wave whip PL259 | 6.95 |
| M-285 | 2m 5/8th whip PL259 | 15.95 |
| EL-2E | 2m 7/8th deluxe whip PL259 | 33.95 |
| NR-07C | 70cms mobile whip P1259 | 25.00 |
| AM-L | Gutter mount fold over type | 12.95 |
| EC-H | PL259/SO239 cable kit for DP-GL | 9.95 |
| SP-M | Heavy duty magnetic mount with cable | 25.95 |

### TWO AMAZING HAM STORES

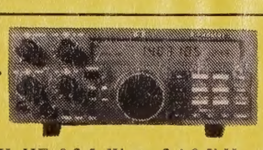
Why not pay a visit to one of the oldest ham radio stores in the business? We have a superb range of goodies on display. Super deals for callers and amazing part exchange prices on your old gear.

Our Hockley emporium (near Southend) is stacked out with new and second hand gear waiting for your custom. Hornchurch (J29 M25) has just been refurbished and we've doubled the display area. Whether it's the latest Kenwood, Yaesu or Icom rig you wish to purchase, or just some ribbon cable, you'll be made equally welcome. We're regularly on the bands using G0PEP and most of us are licensed. Free coffee for the asking at both premises and good honest service from the people who are here today and not gone tomorrow!

### Electronic Keyer £79.95

**Model MFJ-407B** is a budget price electronic keyer that is remarkable value. Operating from internal or external source it provides conventional or iambic keying at speeds from approx 5-50 WPM. Controls include tone, speed, weight and volume. (Needs paddle key).

### QRP!
**NEW ARGONAUT HF Transceiver**



Tentec Argonaut II HF 0.2-5 Watts 2.4-0.5kHz variable xtal filter etc. SSB/CW break-in 1295.00

Mizuho Single band 2 Watts ..... 195.00

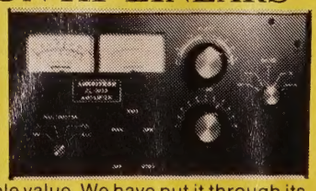
Models for 80/40/20M SSB/CW

10 Watt linears single band ..... 129.00

10 Watt dual band linears ..... 199.00

### AMERITRON HF LINEARS

NEW
**600 Watts**
**£699!**
**AL-811**



This linear is incredible value. We have put it through its paces and it really stands abuse. 3 rugged 811A tubes provide up to 600 Watts output from 160-10m. A hunky mains transformer and full metering is included. Used by DX-peditions it has to be amazing value at

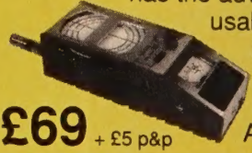
**£699 inc VAT**

**AL-80AX** 1KW from 160-10m 3-500z tube. **£1099.00**

Other Ameritron linears are available. Send SAE today.

### NEW!
### Global MkII Dip Meter

1.5HMz-250MHz. Fully conforms to licence regulations for Wavemeter but has the advantage of being usable for much more including aerial testing and design work such as ATU's etc.



**£69** + £5 p&p

# DJ-X1

# ALINCO

## Scanning Receiver
## 500kHz - 1.3GHz

The DJ-X1 scanning receiver marks a major step forward in both design and performance. ALINCO engineers have applied the very latest technology to produce one of the world's most sensitive and compact handhelds. No other handheld has a similar performance or specification.

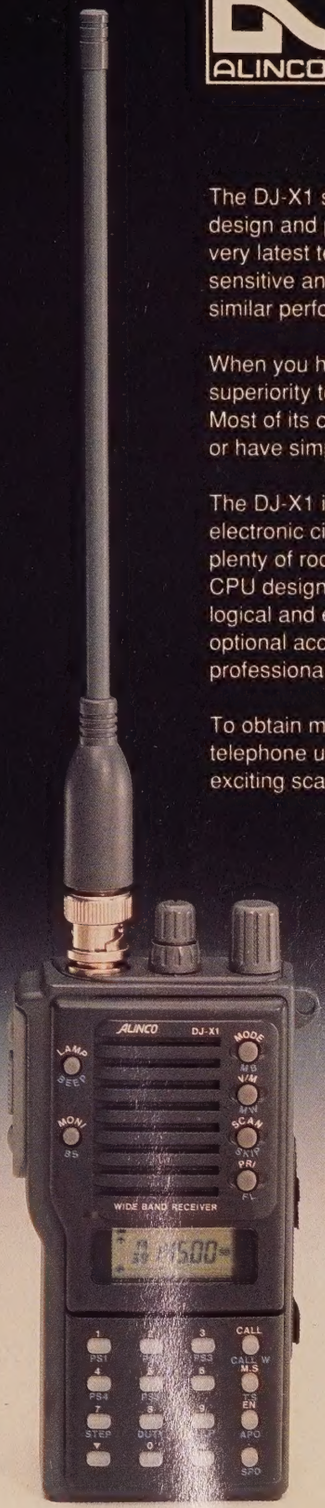
When you handle the DJ-X1 you will immediately appreciate its superiority to any other model. But then that's hardly surprising. Most of its competitors have either been around for several years or have simply undergone cosmetic surgery!

The DJ-X1 is a brand new design from start to finish. Micro electronic circuit boards mean greater reliability whilst leaving plenty of room for 6 long lasting internal AA cells. A revolutionary CPU design provides simple one touch functions that are both logical and easy to remember. And there's a wide range of optional accessories available too that will appeal to the professional user.

To obtain more details contact one of our dealers listed below or telephone us direct for the complete information on the most exciting scanner to be released from Japan for years.

**Specification:**

AM/FM/WBFM
5/9/10/12.5/20/25/30/50/
100kHz steps
100 Memories (3 banks)
Auto Memory Load Bank
3 Scanning Speeds
3 Scanning Modes
Rotary Frequency Control
Call & Priority Channels
Dual Ratio Battery Save
Memory Lockout
Frequency Lock
Illumination Mode
Triple Conversion
External Supply: 6-15V
Internal Pack takes 6 AA Cells
Sensitivity: -8dBu 12dB SINAD
Size:110 x 53 x 37mm
Weight: 320g.




**UK "Gold Seal" Warranty**
*Now with every unit*
*Look for the sign on the box!*

# £269

**"Probably the best performer"**

**"Certainly the best value!"**

## ALINCO STOCKISTS:

**AVON:** G4TJB (0934) 512757 : Uppington Tele-Radio Ltd (0272) 557732 : Amdat (0272) 699352 **BUCKINGHAMSHIRE:** Photo Acoustics Ltd (0908) 610625 **CAMBRIDGESHIRE:** Link Electronics (0733) 346770 **CHESHIRE:** CB37 Communications (0270) 588440 : Flightdeck Ltd 061-499 9340 **CORNWALL:** RV Heming Ltd (0637) 872191 : Marine Instruments (0326) 312414 **COUNTRY DURHAM:** Border Communications 091-4109 6969 **DORSET:** Poole Logic (0202) 683033 **EIRE:** Intronics 010-35321 1631007 **ESSEX:** Waters & Stanton (0702) 206835 : Selectronics (0268) 691481 **HAMPSHIRE:** Farnborough Communications (0252) 518009 : Siskin Electronics (0703) 207155 : Nevada Communications (0705) 662145 **ISLE OF MAN:** Audio & Domestic Spares (0624) 815889 **LANCASHIRE:** Holdings Amateur Electronics (0254) 59595: Stewarts Radio (0253) 21163 **LONDON (CENTRAL):** Pali-Fones 071-436 0022 : Lee Electronics 071- 723 5521 : Ask Electronics 071-637 0590 : Ramsons 071-724 2373 **LONDON (EAST):** Lindsler Communications 081-558 0854 : Waters & Stanton (04024) 44765 **LONDON (NORTH):** Radio Shack 071-624 7174 **LONDON (WEST):** Martin Lynch 081-566 1120 : ARE Communications Ltd 081-997 4476 **MERSEYSIDE:** Amateur Radio Comms (09252) 29881 **NORFOLK:** Eastern Communications (0692) 650077 : DP Hobbs Ltd (0603) 615786 **NORTH HUMBERSIDE:** Heatherlite Communications (0964) 550921 **NORTHERN IRELAND (LONDONDERRY):** Omnicomm (0504) 48295 **NORTHERN IRELAND:** Tyrone Electronics (0662) 242083 **NOTTINGHAMSHIRE:** RAS Nottingham (0602) 280267 **SCOTLAND:** Jaycee Electronics Ltd (0592) 756962 **YORKSHIRE:** PA Electronic Supplies (0709) 527109 **SURREY:** Syon Trading (0372) 272587 **SUSSEX:** BREDHURST ELECTRONICS (0444) 400786 **TYNE & WEAR:** Alyntronics 091-2761002 **WALES:** TMP Electronics (0244) 549563 : Electromart (0792) 842135 **WEST MIDLANDS:** Aviation Hobby Centre 021-782 6560 : Hewards Home Stores Ltd 021 354 2083 : Raycom Communications Ltd 021 544 6767 : Dewsbury Electronics (0384) 390063 **WEST YORKSHIRE:** Fish Communications (0484) 420774 **WORCESTERSHIRE:** Johnson Sound Services (0905) 25740 : SRP Trading (0562) 730672 **YORKSHIRE:** Air Supply (0532) 50981.

**UK Distributors**

## WATERS & STANTON ELECTRONICS

**22 Main Road, Hockley, Essex. Tel: (0702) 206835**

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https://archive.org/details/pract-wireless-1992-03

# South Midlands Communications Ltd

**Southampton** (0703) 255111 **Leeds** (0532) 350606 **Chesterfield** (0246) 453340 **Birmingham** 021-327 1497 **Axminster** (0297) 34918

## DX-PEDITION SPECIAL

**OPTIONS**

FP-22 Internal 240V AC P.S.U.
DVS-2 Digital message storage unit
XF455m CW filter 600Hz

**£1175** inc. VAT

Noisy, crowded frequencies are about as productive as motorways in rush hour. Now, you can jump the queues and head for the wide, open spaces with the FT-650 from Yaesu.

The FT-650 packs substantial communications power in a streamlined, compact case. A flip out handle makes it the perfect portable, especially for those remote locations. The three frequency operation lets you win the battle of the bands on 6m, 10m, and 12m. The transceiver covers from 24 to 56MHz continuous on receive with a full 100W output.

An optional power supply and desk mic are available for base station operation.

## HF EXCELLENCE

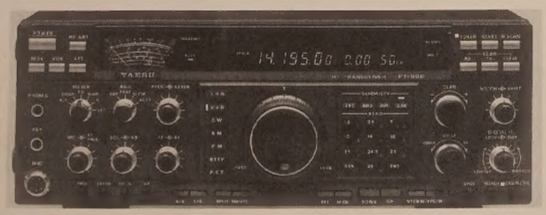
Have you always wanted to stand out from the crowd? Well now's the time to stand head and shoulders above the crowd with the FT-1000 and FT-990 HF transceivers from Yaesu, arguably the crown king and prince of all HF transceivers.
Designed with no expense spared, these transceivers offer exceptional performance combined with the ease of operation, a truly marvellous step forward in HF communications. The FT-1000 and FT990 feature the very latest in electronics and microprocessor technology to ensure a highly reliable and exciting-to-use transceiver for all modes of operation on the HF bands.

### FT-1000

- ✶ Amateur bands Tx 160-10m.
- ✶ General coverage Rx.
- ✶ Dual independent Rx capability.
- ✶ Power output up to 200W PEP.
- ✶ Auto ATU and internal P.S.U.

### FT-990

- ✶ Amateur bands Tx 160-10m.
- ✶ General coverage Rx.
- ✶ Power output up to 100W PEP.
- ✶ Auto ATU and internal P.S.U.
- ✶ 50 memories.



## Look after your radio with *AMCARE*

Through ***AMCARE*** you can now insure for breakdown and/or loss/damage for your amateur radio equipment. Optional cover is available for loss/damage from unattended vehicle. Breakdown cover on its own is the best way to extend the warranty after the initial twelve month period at a very reasonable cost.
Full details available on request.
Scheme administered by Communications Support Ltd.

## *SMC* for all your accessories

### STRUMECH VERSATOWER

**STANDARD 13M20 SERIES**

| | | |
|---|---|---|
| 13M20P25 | 25ft post mount | £468.83 |
| 13M20P40 | 40ft post mount | £660.35 |
| 13M20P60 | 60ft post mount | £777.85 |
| 13M20FB25 | 25ft fixed base mount | £324.30 |
| 13M20FB40 | 40ft fixed base mount | £442.33 |
| 13M20FB60 | 60ft fixed base mount | £609.83 |
| 13M20BP25 | 25ft base plate mount | £553.43 |
| 13M20BP40 | 40ft base plate mount | £767.28 |
| 13M20BP60 | 60ft base plate mount | £863.63 |
| 13M20M25 | 25ft mobile tower | £2226.63 |
| 13M20M40 | 40ft mobile tower | £2439.30 |
| 13M20M60 | 60ft mobile tower | £2613.20 |

**HEAVY DUTY 16M20 SERIES**

| | | |
|---|---|---|
| 16M20P40 | 40ft post mount | £820.15 |
| 16M20P60 | 60ft post mount | £930.60 |
| 16M20P80 | 80ft post mount | £1457.00 |
| 16M20FB40 | 40ft fixed base mount | £658.00 |
| 16M20FB60 | 60ft fixed base mount | £780.20 |
| 16M20FB80 | 80ft fixed base mount | £1245.50 |
| 16M20BP40 | 40ft base plate mount | £869.50 |
| 16M20BP60 | 60ft base plate mount | £972.90 |
| 16M20BP80 | 80ft base plate mount | £1563.93 |
| 16M20M40 | 40ft mobile tower | £2909.30 |
| 16M20M60 | 60ft mobile tower | £3031.50 |
| 16M20M80 | 80ft mobile tower | £3760.00 |

**MIDITOWER SERIES**

| | | |
|---|---|---|
| P30 | 30ft post mount | £500.55 |
| BP30 | 30ft base plate mount | £528.75 |
| PB30 | 30ft fixed base mount | £429.09 |

36ft versions of above.
1 extra section add £45.83

All towers except mobiles are available from stock 13M20 and 16M20 series all supplied with auto brake winches. All are supplied with H2R head unit drilled to take GS-065 bearing. Holding down bolts for BP and FB towers are available at £29.38 per set extra.
Alternative winches and head units are available at extra cost.
Delivery is by quotation dependent upon distance.

### ROTATORS

Suberb engineering standards combined with pin sharp setting accuracy means new technology from Yaesu create Kenbro Hygain.

| | | | |
|---|---|---|---|
| G-250 | Bell type twist/switch CTL | £79.70 | C |
| G-400 | Bell type meter controller | £152.00 | C |
| G-400RC | Bell type round controller | £182.89 | C |
| G-600RC | Bell type round controller | £240.11 | C |
| G-800SDX | Bell type 450 deg. var. speed | £332.07 | C |
| G-1000SDX | Bell type 450 deg. var. speed | £376.00 | C |
| G-2000RC | Bell type round controller | £454.68 | C |
| G-2700SDX | Bell type 450 deg. var. speed | £649.00 | E |
| G-500A | Elevation meter controller | £203.32 | C |
| G-54008 | Azimuth/elev. dual control | £383.16 | D |
| G-56008 | Azimuth/elev. dual control | £444.00 | D |
| RC5-1 | Bell type round controller | £223.76 | C |
| RC5-3 | Bell type preset | £280.98 | C |
| RC5A-3 | Bell type var. speed. & preset | £434.24 | C |
| RC5B-3 | Bell type var. speed. & preset | £689.68 | D |

**ROTATOR HARDWARE**

| | | | |
|---|---|---|---|
| GS-050 | Rotary bearing 1.5" mast | £20.39 | B |
| GS-065 | Rotary bearing 2" mast | £30.60 | B |
| GC-038 | Lower mast clamp G-400, 600 etc | £17.32 | B |
| 9523 | Channel master bearing | £20.39 | B |
| CK46 | Rotary bearing 1.5-2.5 mast | £35.71 | B |
| MC1 | Lower mast clamp RC5 series | £35.76 | C |

**COMPUTER INTERFACES FOR G-5400/G-56008**

| | | | |
|---|---|---|---|
| IF-100PC | I/F C/W lead & software IBMPC | £142.02 | B |
| IF-100C64 | I/F C/W lead & software CBM64/128 | £148.16 | B |

**ROTATOR CONTROL CABLE**

| | | |
|---|---|---|
| RC5W | 5 way G-250, 400, 600, RC XR500 per mtr. | £0.74 |
| RC3W | 8 way G-2000 create series | £0.88 |

**CARRIAGE**

Rotator cable
£3.50 up to over 20 mtrs. over 20 mtrs. £5.00

### DAIWA POWER SUPPLIES

The Daiwa range of power supplies is proving very popular for all types of applications, both for the professional user and the hobbyist alike. From the smallest 9A continuous PS120MkII, via the extremely popular 24A PS304, to the top of the range 32A continuous RS40X. All the Daiwa range of PSU's feature variable voltage from at least 3-15V and switchable voltage 1 current metering. Both the PS304 and RS40X have a cigar lighter socket, convenient for powering your handheld.
Also available from Daiwa are some good quality SWR/PWR meters and coax switches.

**POWER SUPPLIES**

| | | | | |
|---|---|---|---|---|
| PS120 M2 | 3-15v Variable | 9A/12A max | £69.95 | C |
| PS304 | 1-15v Variable | 24A/30A max | £129.95 | D |
| RS40X | 1-15v Variable | 32A/40A max | £109.00 | D |

**COAX SWITCHES**

| | | | | |
|---|---|---|---|---|
| CS201 | 2 Way SO239 | DC-600MHz 1kW | £13.95 | A |
| CS201G2 | 2 Way N | DC-2GHz 1kW | £27.50 | A |

**SWR METERS**

| | | | | |
|---|---|---|---|---|
| CN101 | 1.8-150 MHz | 15/150/1500W | £59.95 | B |
| CN103N | 150-525MHz | 20/200W N | £69.95 | B |

**LINEAR AMPLIFIER**

| | | | | |
|---|---|---|---|---|
| LA208H | 2m 1.5-5W in | 30-80W out | £159.95 | C |

### TOKYO HY-POWER PRODUCTS

**TRANSCEIVERS**

| | | | |
|---|---|---|---|
| HT106 | 6m transceiver 10W P.E.P. SSB/cs | £306.50 | C |
| HT120 | 20m transceiver 10W P.E.P. SSB/cw | £305.50 | C |
| HT180 | 80m transceiver 10W P.E.P. SSB/cw | £305.50 | C |
| HP100S | Power supply for HT series | £99.00 | B |
| HC100 | A.T.U. 80-10m 5 band 200W P.E.P. | £109.00 | B |
| HCF100 | CW narrow filter HT series | £39.85 | A |
| HNB100 | Noise blanker HT series | £19.95 | A |
| HBK100 | Mobile bracket HT series | £10.20 | A |

**LINEARS**

| | | | |
|---|---|---|---|
| HL2K | 160-10m HF linear 2kW | £1450.00 | E |
| HL1K | 160-10m HF linear 1kW | £899.00 | D |
| SAGRA-600 | 2m 25W drive 600W output | £815.00 | E |
| HL100B/10 | 10m 10W in 100W output P.E.P. | £182.00 | C |
| HL1000/20 | 20m 10W in 100W output P.E.P. | £182.00 | C |
| HL100B/80 | 80m 10W in 100W output P.E.P. | £182.00 | C |
| HL66V | 6m 10 in 50-60W output | £131.75 | C |
| HL166V | 6m 3/10W in 80/160W output | £255.00 | C |
| HL37V | 2m 3W in 32W output | £90.95 | B |
| HL62V | 2m 10W in 60W output | £137.95 | C |
| HL110V | 2m 2/10W in 100W output | £220.00 | C |
| HL180V | 2m3/10/25W in 170W output | £299.00 | C |
| HL36U | 70cm 6/10W in 25/30W output | £138.00 | B |
| HL63U | 70cm 10/25W in 50W output | £220.00 | C |
| HL130U | 70cm 3/10/25W in 120W output | £397.00 | C |

**TRANSVERTERS**

| | | | |
|---|---|---|---|
| HX240 | 2m to HF80, 40, 20, 15 & 10m 2.5W/10W in 30-40W P.E.P. output | £254.50 | B |
| HX640 | 6m to HF as above | £254.50 | B |

ALL POSTAGE PRICES ARE AS FOLLOWS: A-£1.95 B=£4.75 C=£6.60 D=£11.00 E=£16.50


**Southampton** (0703) 255111
SMC HQ, School Close
Chandlers Ford Ind. Est.
Eastleigh
Hants SO5 3BY
9am–5pm Mon-Fri
9am–1pm Sat

**Leeds** (0532) 350606
SMC Northern
Nowell Lane Ind. Est.
Nowell Lane
Leeds LS9 6JE
9am–5.30pm Mon-Fri
9am–1pm Sat

**Chesterfield** (0246) 453340
SMC Midlands
102 High Street
New Whittington
Chesterfield
9.30am–5.30pm
Tues–Sat

**Birmingham** 021-327 1497
SMC Birmingham
504 Alum Rock Road
Alum Rock
Birmingham B8 3HX
9am–5pm Tues-Fri
9am–4pm Sat

**Axminster** (0297) 34918
Reg Ward & Co. Ltd
1 Western Parade
West Street
Axminster
Devon EX13 5NY
9am–5.20pm Tues–Sat


- *Up to £1000 instant credit, a quotation in writing is available on request, subject to status.*
- *Yaesu Distributor Warranty, 12 months parts and labour.*
- *Carriage charged on all items as indicated or by quotation.*
- *Prices and availability subject to change without prior notice.*
- *Same day despatch wherever possible.*

# KW COMMUNICATIONS

**Chatham Road, Sandling**
**Nr Maidstone, Kent ME14 3AY**
**Telephone: 0622 692773**
**Fax: 0622 764614**

VISA Access

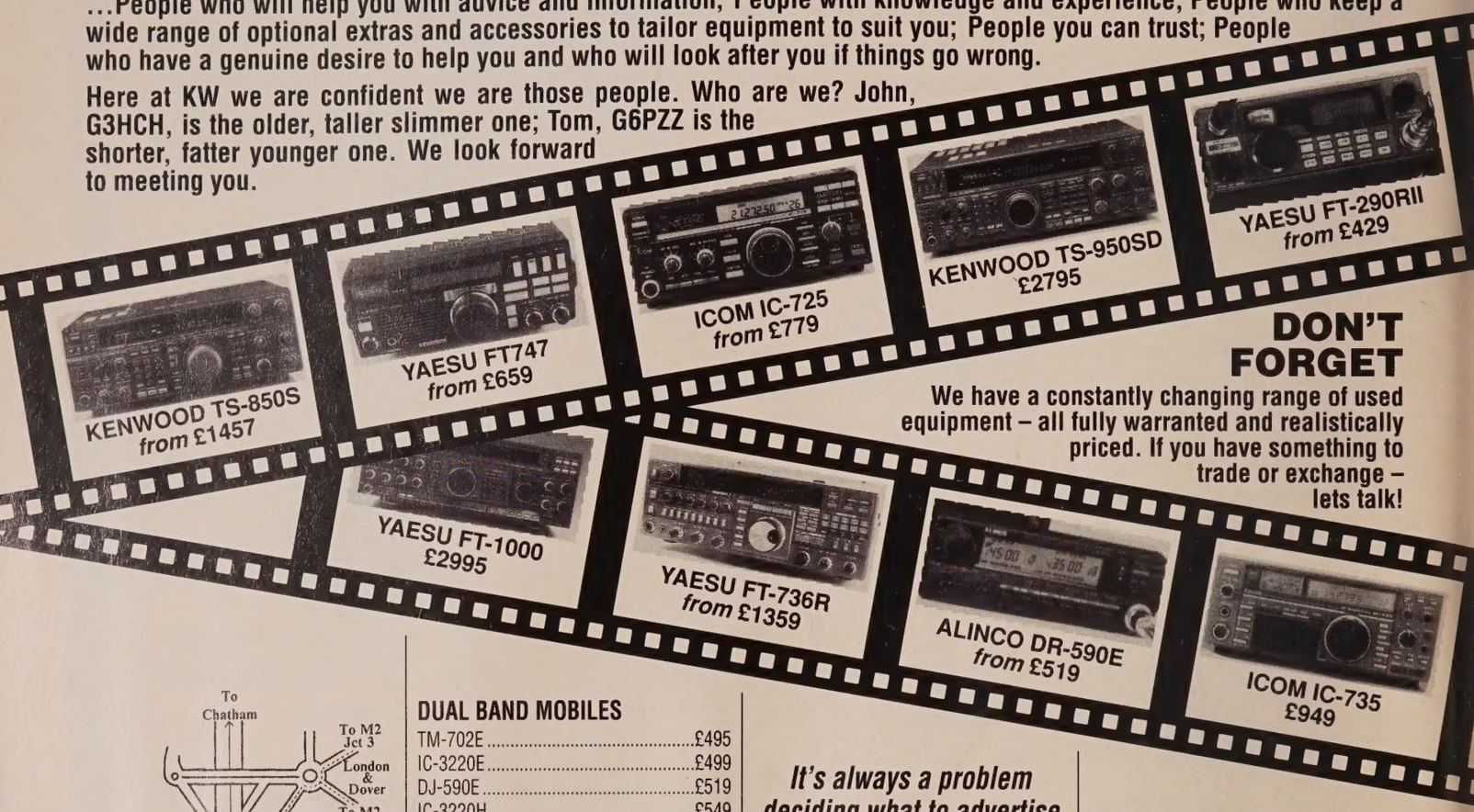
Instant credit available
Mail/telephone order by cheque or credit card (E & OE)

**You will probably spend a great deal of money on your next radio – therefore it's essential you buy it from the right people...**

LONDON AMATEUR RADIO & COMPUTER SHOW

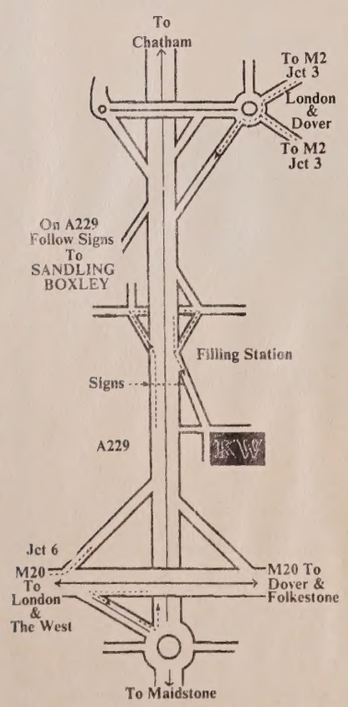
**...People who will help you with advice and information; People with knowledge and experience; People who keep a wide range of optional extras and accessories to tailor equipment to suit you; People you can trust; People who have a genuine desire to help you and who will look after you if things go wrong.**

**Here at KW we are confident we are those people. Who are we? John, G3HCH, is the older, taller slimmer one; Tom, G6PZZ is the shorter, fatter younger one. We look forward to meeting you.**




## DON'T FORGET

**We have a constantly changing range of used equipment – all fully warranted and realistically priced. If you have something to trade or exchange – lets talk!**




**OPENING HOURS:**

**MONDAY-SATURDAY**
**9.30am-6pm**
**(MON open 10am, SAT close 5pm)**

### DUAL BAND MOBILES

| | |
|---|---|
| TM-702E | £495 |
| IC-3220E | £499 |
| DJ-590E | £519 |
| IC-3220H | £549 |
| TM732E | NEW £595 |
| IC-2410E | £625 |
| FT-5200 | £659 |
| IC-2410H | £649 |
| TM741E | £759 |

(BAND UNITS EX-STOCK FOR TM-741E)

### DUAL BAND HAND-HELDS

| | |
|---|---|
| DJ-560E | NOW £299 |
| TH-77E | £395 |
| IC-W2E | £395 |

### 2 METRE HAND-HELDS

| | |
|---|---|
| KT-22 | £139 |
| DJ-S1E | £179 |
| TH-26E | NOW £229 |
| TH-27E | NOW £239 |
| DJ-F1E | £239 |
| IC-2PE | NEW £259 |
| IC-2PET | NEW £275 |
| FT-415 | NEW £279 |

### 70 CENTIMETRE HAND-HELDS

| | |
|---|---|
| KT-44 | £159 |
| DJ-460E | £249 |
| TH-46E | NOW £259 |
| TH-47E | NOW £269 |
| IC-P4E | £275 |
| IC-P4ET | £295 |
| FT-815 | NEW £295 |

***It's always a problem deciding what to advertise – we stock so much! Here's a small selection from our range of antennas and accessories***

| | |
|---|---|
| Cushcraft R5 | £269 |
| Cushcraft R7 | £369 |
| Cushcraft AP8 | £192 |
| Diamond CP86 | £209 |
| HS-VK5JR | £222 |
| HS-WX1 | £64 |
| HS-WX2 | £83 |
| Global GDO | £69 |
| MFJ-948 ATU | £129 |
| MFJ-949D | £149 |
| MFJ-901B | £69 |
| MFJ-260B | £35 |
| MFJ-207 | £99 |
| MFJ-931 | £79 |
| EP-925 25A PSU | £99 |
| Coax switches | from £19 |
| Dummy loads | from £16 |
| Adonis FX-1 | £55 |
| 2m 5/8 + 6m 1/4 mobile | £16 |

## HF TRANSCEIVERS

| | |
|---|---|
| FT-747 | £659 |
| IC-725 | £779 |
| IC-735 | £949 |
| FT-757GXII | £969 |
| FT-650 | £995 |
| IC-726 | £1015 |
| TS-450S | £1220 |
| TS-450SAT | £1375 |
| TS-690S | £1395 |
| TS-850S | £1475 |
| IC-751A | £1535 |
| FT-767GX | £1599 |
| TS-850SAT | £1625 |
| FT-990 | £1849 |
| IC-725 | £2550 |
| TS-950SD | £2995 |
| FT-1000 | £2995 |
| IC-781 | £4595 |

***Also in stock a wide range of shortwave receivers and VHF/UHF scanning receivers!!***

ICOM

# SUPER HAMSTORE

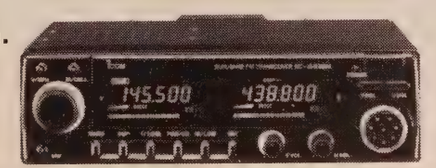
**STAND 'S'**
**RED HALL**
**L.A.R.S.**
**7/8th.MARCH**

# AT THE 1992 LONDON AMATEUR RADIO SHOW

ICOM's stand at the London Amateur Radio Show at Pickett's Lock, Edmonton will in effect be one large retail hamstore where you will be able to buy the ICOM rig of your choice. If you have not yet been able to visit either of our new Hamstores in Kent or Birmingham then a trip to Pickett's Lock is just what the doctor ordered.
On show will be ICOM's full range of Ham equipment, 'hands-on' demonstration literature and friendly advice will always be on-tap on ICOM's Stand S, Red Hall.

**Here are just a few examples of latest models available at the show...**

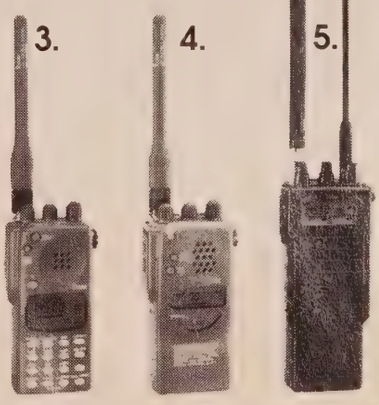
1.



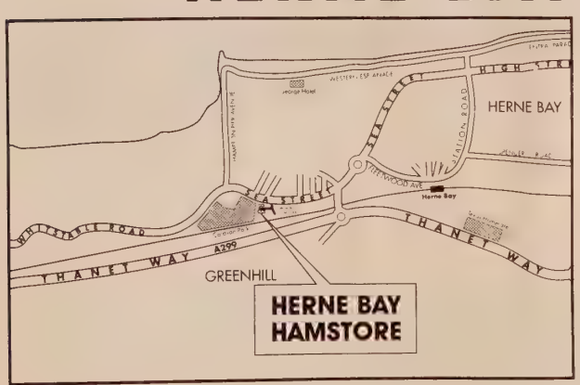
2.

**1. IC-2410E 144/430MHz Dual Band FM Mobile £625.**
**2. IC-R7100 25MHz/2GHz Wide Band Receiver £1120.**
**3. IC-P2ET 144MHz FM Handheld Transceiver £275.**
**4. IC-P2E 144MHz FM Handheld Transceiver £259.**
**5. IC-2SR 144MHz FM Handheld Transceiver/Wide Band Receiver £425.**

3. 4. 5.



## HERNE BAY

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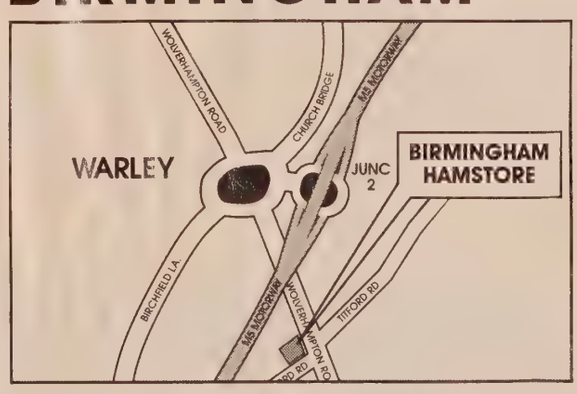


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## H.F. TRANSCEIVERS

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|---|---|---|
| TS950SD | HF transceiver with auto ATU, all filters, DSP, SO2 | 2995.00 |
| TS950S | HF transceiver with auto ATU | 2299.00 |
| TS850SAT | HF transceiver with auto ATU | 1625.00 |
| TS850S | HF transceiver without ATU | 1475.00 |
| TS450SAT | HF transceiver with auto ATU | 1375.00 |
| TS450S | HF transceiver without ATU | 1220.00 |
| TS690S | HF transceiver with 6 metres (50W) | 1395.00 |
| TS140S | HF transceiver without ATU | 880.00 |
| TRC70 | HF transceiver for commercial use | 1169.13 |
| IC-781 | HF all band, general coverge receiver, built-in ATU and PSU, spectrum scope | 4595.00 |
| IC-765 | HF all band, general coverge receiver, built-in ATU and PSU | 2550.00 |
| IC-751A | HF all band, general coverage RX, 12V | 1535.00 |
| IC-735 | HF all band, general coverage RX, 12V | 949.00 |
| IC-726 | HF/6m, general coverage RX, 12V | 1015.00 |
| IC-725 | HF all band, general coverage RX, 12V | 779.00 |
| FT1000 | All mode HF transceiver, general coverage dual receive | 2995.00 |
| FT990 | All mode transceiver, general coverage, mains PSU, auto ATU | 1895.00 |
| FT890 | All mode transceiver, general coverage receive | 1075.00 |
| FT890TU | All mode transceiver, general coverage RX, c/w internal ATU | 1250.00 |
| FT747GX | General coverage receiver, ham bands transceiver | 689.00 |
| FT767GX | General coverage receiver, ham band transceiver | 1685.00 |

SGC SG-230

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**SSB, AM, CW & DATA**
**FAST – INTELLIGENT – ACCURATE**
**OPERATES WITH ANY HF TRANSCEIVER**

The Smartuner high technology coupler intelligently tunes any length antenna (8 to 80ft) in the HF band. The unit will operate with any HF transceiver within its specifications. The Smartuner switches 64 input and 32 output capacitance combinations plus 256 inductance combinations in a "pi" network resulting in over a half million different ways to ensure a perfect match for the transceiver; and, it remembers the frequency and the tuning values and will re-select these values in less than 10 ms next time you transmit on that frequency.

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## VHF/UHF TRANSCEIVERS

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|---|---|---|
| TS790E | All mode tri-bander base station. 2m/70cm fitted. 23cm option unit | 1595.00 |
| TS711E | All mode 2m base transceiver | 925.00 |
| TR751E | All mode 2m mobile transceiver. 25W | 625.00 |
| TM741E | FM tri-bander with 2m and 70cm fitted. 10m/6m/23cm options | 759.00 |
| TM732E | 2m/70cm FM dual band compact mobile transceiver. Dual receiver | 595.00 |
| TM702E | 2m/70cm FM compact dual band transceiver. 25W/25W | 495.00 |
| TM531E | 23cm FM compact mobile transceiver. 10W | 415.00 |
| TM441E | 70cm FM compact mobile transceiver. 35W | 345.00 |
| TM241E | 2m FM compact mobile transceiver. 50W | 325.00 |
| IC-229E | 2m FM mobile 25W, 20 memories, 12V | 299.00 |
| IC-229H | 2m FM mobile, 50W, 20 memories, 12V | 349.00 |
| IC-275E | 2m transceiver, SSB/FM/CW, 25W, PSU | 1090.00 |
| IC-275H | 2m transceiver, SSB/FM/CW, 100W, 12V | 1060.00 |
| IC-449E | 70cm FM mobile, 35W, 20 memories, 12V | 359.00 |
| IC-475E | 70cm transceiver SSB/FM/CW 25W PSU | 1210.00 |
| IC-475H | 70cm transceiver, SSB/FM/CW, 75W, 12V | 1275.00 |
| IC-575H | 6m/10m TX, RX, SSB/FM/CW 100W, 12V | 1225.00 |
| FT290R2 | Transceiver 2m 2.5W multimode portable | 429.00 |
| FT690R2 | Transceiver 6m 2.5W multimode portable | 429.00 |
| FT790R2 | Transceiver 70cm 2.5W multimode portable | 499.00 |
| FT2400RH | Transceiver 2m 50 watt synthesised | 349.00 |
| FT212RH(B) | Transceiver 2m, FM, 45W synthesised | 329.00 |
| FT712RH | Transceiver 70cms, FM, 35W synthesised | 359.00 |
| FT5200 | 2m/70cm dual band transceiver 50/40W o/p | 659.00 |
| FT736R | Multimode VHF/UHF base c/w 2m. 70cms & duple | 1395.00 |
| FT650 | Multimode 6m, 10m and 12m | 1175.00 |
| DR-112EM | 2m FM 25W mobile transceiver | 269.00 |
| DR-112E | 2m FM 45W mobile transceiver | 289.00 |
| DR-410E | 70cms FM 35W mobile TX | 329.00 |
| DR-590E | 2m/70cm FM 45/35W dual display | 519.00 |

## VHF/UHF HAND PORTABLE TRANSCEIVERS

| | | |
|---|---|---|
| TH26E | 2m FM hand portable transceiver with PB10 battery | 229.00 |
| TH27E | 2m FM mini hand portable transceiver with PB13 battery | 239.00 |
| TH46E | 70cm FM hand portable transceiver with PB10 battery | 259.00 |
| TH47E | 70cm FM mini hand portable with PB13 battery | 269.00 |
| TH77E | 2m/70cm FM dual band hand portable transceiver. PB10 battery | 395.00 |
| IC-W2E | 2m/70cm FM hand portable including Nicad | 395.00 |
| IC-2SE | 2m FM hand portable including Nicad/charger | 269.00 |
| IC-2SET | 2m FM hand portable, keypad entry DTMF | 299.00 |
| IC-2SRE | 2m FM hand portable + wide band RX | 425.00 |
| IC-P2E | 2m FM hand portable including Nicad/charger | 259.00 |
| IC-P2ET | 2m FM hand portable including Nicad/charger | 275.00 |
| IC-2GE | 2m FM hand portable including Nicad/charger | 269.00 |
| IC-4SET | 70cm FM hand portable keypad entry DTMF | 316.00 |
| IC-4SRE | 70cm FM hand portable + wide band RX | 445.00 |
| IC-P4E | 70cm FM hand portable including Nicad/charger | 275.00 |
| IC-P4ET | 70cm FM hand portable including Nicad/charger | 299.00 |
| FT26 | 2m handy c/w FNB28 NC28C | 259.00 |
| FT76 | 70cm handy c/w FNB28 NC28C | 269.00 |
| FT411 | TX, RX synthesised 2m keypad c/w FNB17 Nicad | 249.00 |
| FT811 | TX, RX synthesised 70cms keypad c/w FNB17 | 269.00 |
| FT911 | TX, RX synthesised 23cms keypad c/w FNB17 | 369.00 |
| FT470 | TX, RX synthesised 2m + 70cms keypad | 409.00 |
| FT415 | 2m keypad handy c/w FNB23 & NC28C | 279.00 |
| FT815 | 70cm keypad handy c/w FNB28 & NC28C | 295.00 |
| DJ-S1E | 2m FM 2.5W 41 memories + drycell pack | 179.00 |
| DJ-F1E | 2m FM keypad 2.5W 41 memories + AIR RX | 239.00 |
| DJ-460E | 70cms FM keypad dial 2W 12V=5W | 249.00 |
| DJ-560E | 2m/70cm FM 2W dual display/watch | 329.00 |

## RECEIVERS

| | | |
|---|---|---|
| R5000 | HF high performance communications receiver | 925.00 |
| R2000 | HF general purpose communications receiver | 549.00 |
| IC-R9000 | 100kHz – 2GHz receiver CRT display | 4080.00 |
| IC-R7100 | 25-2000MHz receiver | 1120.00 |
| IC-R100 | Wideband receiver | 510.00 |
| IC-R72E | General coverage receiver | 659.00 |
| IC-R72E | General coverage receiver, with back-up battery | 689.00 |
| IC-R71E | General coverage receiver | 875.00 |
| IC-R1 | Hand portable receiver | 349.00 |
| FRG8800 | Receiver 0.15-30.0MHz AM/CW/SSB/NBFM | 665.00 |
| MVT-7000 | 200kHz-1300MHz WFM/NFM/AM | 289.00 |
| Alinco DJ-X1 | hand-held scanner 100kHz-1300MHz WFM/NFM/AM | 269.00 |
| AR2000 | New hand-held receiver 500kHz to 1300MHz | 269.00 |
| AR1500 | New hand-held scanner, 500kHz-1300MHz, WFM/NFM/AM/SSB!! | approx. 300.00 |
| AR3000A | New base/mobile receiver with RS232. 100kHz-2036MHz, all modes | 765.00 |
| AR2800 | Base/mobile receiver with SSB. 500kHz-600MHz and 800MHz-1300MHz with built-in Nicad | 395.00 |
| HF-150 | HF communications receiver. 30kHz-30MHz. USB/LSB/CW/AM | 329.00 |
| HF-225 | HF communications receiver. 30kHz-30MHz. USB/LSB/CW/AM AMS/FM (optional) | 429.00 |
| R550 | Airband receiver. 40 memories with scan and search | 129.00 |

## DISCONES

| | |
|---|---|
| SKYSCAN V1300 discone 25-1300MHz | 49.95 |
| SKYSCAN V1300 desktop discone | 42.95 |
| SKYSCAN mag mount mobile scanning aerial | 24.95 |

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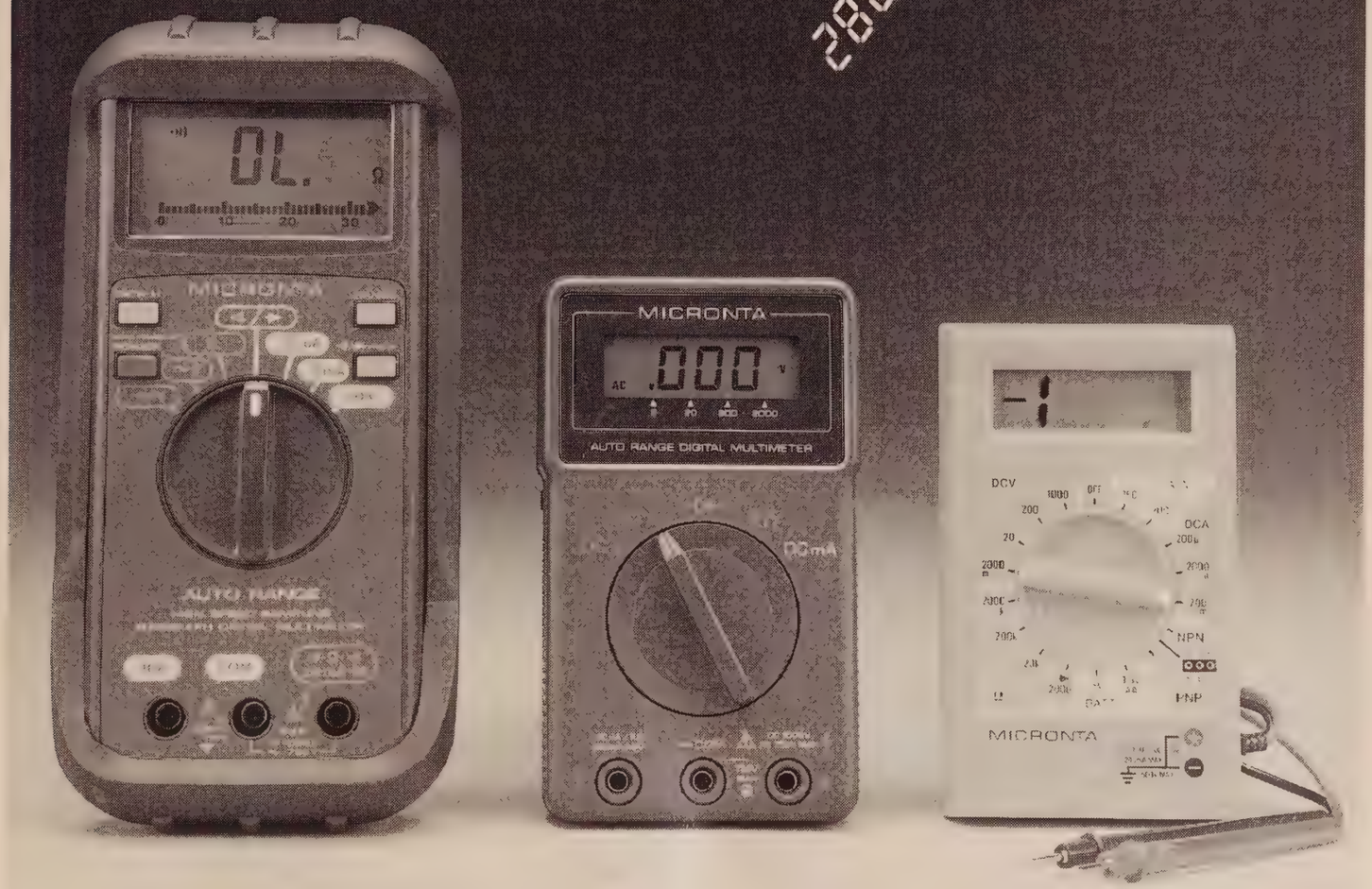


## DUAL DISPLAY

**£49.95**

**Autoranging.** Large display plus 32-segment bargraph. Data hold, range control, diode and continuity check. Measures to 1000 VDC, 700 VAC, 10A AC/DC, resistance to 30 megohms. With moulded rubber holster. Requires 2 "AA" batteries. **22-167** ..... **£49.95**

## COMPACT AUTORANGE

**£29.95**

**Autoranging.** Features diode-check, auto polarity. Easy-to-read LCD display, low-battery indicator. Measures AC/DC volts, DC current and resistance. Fuse protected. Requires 2 "AA" batteries.
**22-166** ..... **£29.95**

## MINI DMM

**£22.95**

**Mini DMM.** With built-in test leads. Measures 1000 VDC, 750V AC, 200mA DC current. Resistance to 2 megohms. Built-in transistor checker NPN/PNP hFE, 1.5 and 9v battery checker. Requires 9v battery.
**22-9022** ..... **£22.95**

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# MARTIN LYNCH

G4HKS

## THE AMATEUR RADIO EXCHANGE CENTRE

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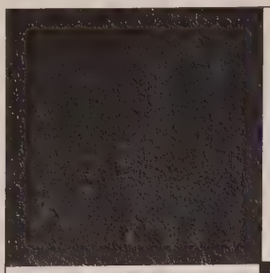
## WHO WANTS TO PLAY THE GAME AT PICKETS LOCK THIS YEAR?

1991 Pickets Lock was the first AMATEUR RADIO SHOW MARTIN LYNCH attended. To date, it still rates as one of the most successful events for my company. Gone closing time, people were still queuing to buy good clean used equipment from me. Since then I've acquired all the "BRAND NAMES" as an authorised retailer. Therefore, in addition to the wealth of second hand guaranteed equipment, I can now offer all the latest products with back up from the manufacturers themselves. This year's exhibition will be an even BIGGER success – I have lots more to offer – in terms of choice AND even better prices. Come along and visit the event of the year for Amateur Radio –Myself, Valerie, John and Chris are in the RED HALL, STAND R, opposite ICOM UK. SEE YOU THERE!!

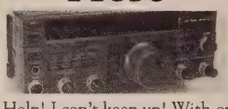


**YAESU FT1000**
The greatest HF transceiver will be on show – don't miss it!

**YAESU FT990**

This one will also be on and working – MEGA deals on trade-ins or out-right buys

**YAESU FT890**



Help! I can't keep up! With or without ATU I cannot get enough. FT757GX queue owners here.

**YAESU FT767GX Series II**

Last year I was offering this excellent set with 2 and 6 metre modules at a special price – I can't be doing it again???

**YAESU FT736R**

Who bought, in 1991, an FT736R with 6m included for a daft price then? NO? Come along and see me!

**YAESU FT470R**
Just a few left at a very special price. Dual band handie, comes with nicads and charger.

**YAESU FT26/76/415/815**
Yaesu's latest handies all available for free groping (demonstrations by Valerie at no extra...)

**Kenwood TS950SD**
Alternative to the FT1000 – if you are seriously interested then lets have a serious haggle.

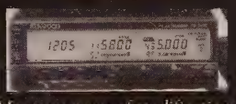
**Kenwood TS850S**

With or without ATU this has proved a favourite – so have my trade-in deals. Make yourself happy this Easter – stick the Easter egg!

**Kenwood TS450/690S**

It's a winner and it really is better than the old TS440. Bring yours along for trade-in and I'll show you.

**Kenwood TM741E**



My seven pages of modifications for this one helped sell even more – only from MARTIN LYNCH.

**ICOM ICW2E**
Outsells all other dual banders – see why on the MARTIN LYNCH stand.

**ICOM IC4SRE/2SRE**
You asked for a scanner with a 2m or 70cm transceiver and you got it!

**ICOM ICR7100HF 50kHz-2GHz**
Takes over from the old ICR7000HF – see PW for the excellent review and see it demonstrated by Chris Parnell – the originator of the HF conversion.

**ALINCO DJF1E/S1E**
They work well – very well and have proved to be ultra reliable – see for yourself the superb engineering in these two handies.

**ALINCO DJX1E**
Unbeatable miniature pocket scanner – with FREE NICADS and CHARGER only at PICKETS LOCK!!

**Yupiteru MVT7000**
Ranks the favourite with Graeme, my resident scanner expert. Come and see why at Pickets Lock.

**Yupiteru VT125/150**
Miniature air band/marine hand scanners. Offered with nicads and charger.

**AOR AOR1500**
The only hand held scanner with ssb facility fitted as standard. In stock.

**AOR AOR2000**
Comes complete with all accessories at a special show price!

**AOR AOR2800/2500**
Fantastic value base/mobile scanner with all mode capability. Great trade-ins.

**AOR AOR3000A**
Latest version of the ultimate "AOR". Unbeatable prices on this one – but make sure it's a "UK" approved model!

## ACCESSORIES

A full range of accessories will be carried at the show. Pop along and see me.

## USED EQUIPMENT

FOR THE LARGEST INDEPENDENT RETAILERS LIST OF SECOND HAND EQUIPMENT IN EUROPE, PHONE OR CALL AT THE STAND. THERE IS SO MUCH FOR THE SHOW, I HAVE MADE A BOOK OUT OF IT!!

Cannot make it to the show? Don't worry, not everyone wants to visit NORTH LONDON. Although all hands will be at PICKETS LOCK and the shop is closed during those days, the special offers will be available MAIL ORDER.

Phone us before or during show days on **0860 339 339** or **081 566 1120** if you want to reserve your new rig!

# Keylines

Over the Christmas holidays I had a home-brew extravaganza. I didn't really have any choice, because as luck would have it, all my h.f. band equipment developed faults which required spares I didn't have in stock! So, it was a case of 'out with the soldering iron' and building some simple rigs to get back on the air.

I thoroughly enjoyed myself, and it was a change from watching too much TV over the holiday! I re-discovered the joys of getting a really simple rig 'on the air'. I also managed to restart work on several long delayed projects, including a valved h.f. c.w. only transceiver. I started building this project before my eldest daughter (she's 15 this month!) was born!

## Chaotic Shack

My shack is at one end of our garage. It's rather a chaotic shack, and I don't have a lot of space. In previous homes, I've usually taken over the whole garage, as well as having a shack in the garden. This time however, the high cost of a new shack has curbed my desires somewhat.

Despite being limited to a rather small working space, I'm pleased to say that the workshop is fully equipped. It's also quite cool in the summer and it has a very good bench and storage facilities. I've also fitted the workshop out with an earth leakage circuit breaker and an isolating transformer.

The isolating transformer is always used when I am working on a newly-built mains powered project, or when an item of valved equipment is being repaired or tested. During the past months, this transformer (I bought it at a rally about 10 years ago!) has proved its worth on two occasions.

The first was when my Eddystone 750 receiver decided to develop a fault on the secondary side of the mains transformer. The second occasion was when I dropped the partially completed valved transceiver from the workbench, onto a mains lead.

## Worthwhile Protection

The heavyweight isolation transformer provides worthwhile protection. The poor old Eddystone 750, which I had used continually for almost 30 years, developed a mains transformer fault, that led to the chassis becoming live. This happened when I was investigating an intermittent short-circuit on the h.t. line, which turned out to be a faulty (originally fitted in 1949) de-coupling capacitor.

The other problem turned out to be much more of a disaster. This was because when I dropped the valved h.f. transceiver from the edge of the workbench, on the way down it fell on to the mains lead running to a battery charger. The edge of the chassis, with the weight of the mains transformers behind it, sliced and chafed through the cable's insulation several times. This exposed both the the live and neutral conductors in various places.

Fortunately for me, I would have been safe either way. If the battery charger had been plugged into the mains, the earth leakage circuit breaker would have operated, isolating the supply.

As it was, I had the battery charger plugged into the isolation transformer, and apart from a slight 'tingle' when I touched the chassis, I was unhurt. It was quite a surprise to see how much damage was caused by one item of equipment falling only a metre or so.

## Important Considerations

The incident in my shack drew my attention to several important considerations for safety in the shack. The first was that you should **alwa** have an earth leakage protection device (a doub pole type is essential for f safety) and used if possibl in conjunction with an isolation transformer.

These two safety precautions will go a long way in helping to avoid possibly lethal electric shocks. Although isolation transformers aren't cheap...what price can buy back your life?

An added advantage, is that when you're operating your main station via an earth-leakage circuit-breaker **AND** an isolation transformer, you can quite safely earth your equipment via your own 'ground' system.

Operating in this way gets over the thorny problem of the protective multiple earth (PME) system (as discussed in *PW* March issue last year), to everyone's safety advantage. This is because in effect, you're only using the mains supply to induce a supply in the transformer secondary.

So, you can quite safely use your own earth system. You'll also be safely covered if any faults develop with your, or any equipment or the PME system.

## Chassis Damaged

My problems didn't end with the mains cable being cut. The partially-built transceiver chassis was damaged in the process. Various items were bent, and several variable capacitors had to be scrapped and the Eddystone 898 dial suffered by having its front dial plate damaged.

Worst of all though, was the complete 'mangling' of the Electroniques front end unit. The tuning capacitor of this (now rare) STC-made unit was beyond repair.

As I'm an avid collector of spares, I was able to replace the tuning capacitor from a partially stripped-down valved Electroniques front end. Unfortunately though, I still need a 1.6MHz i.f. transformer for the unit. But I've no doubt that there are one or two un-used Electroniques front ends around. Can anyone help me out, so that after 15 years, I can finish the job?

## Can You Help?

My own need for the spares for the Electroniques front end, reminded me that we often receive letters from readers with the request 'Can You Help?' Very often they're asking for help to locate difficult components, information or specific parts for obsolete equipment, and ve find room to print them as often as we can (see page 8). After all, *PW* places high priority on home onstruction, and I don't want anyone to feel as frustrated as I did when I dropped my partially-built rig!

So, in future, we'll publish your requests as soon as we can. However, although we want to help you, we'll have to be strict and limit the service to requests for help, advice and specific components only. 'Bargain Basement' is available for everything else for a very modest charge.

Please make your request as short as possible, with your name and a telephone number if possible. Enclose a large s.a.e., and we'll forward any letters if you don't want your full address published.

Best of luck home-brewing, don't drop your gear on the floor, keep a clean and tidy shack and do use an earth-leakage protection device and an isolation transformer. It's for your own life's sake!

## Good Read

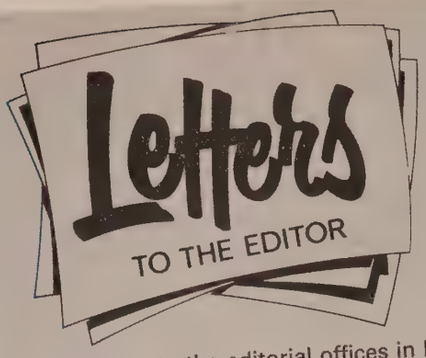
The entire *PW* team is working really hard to provide you with a good-value read every month. We've managed to keep the cover price unchanged for **over two years**, but now you will have noticed our cover price has risen.

I've no doubt that readers will understand that many aspects of the economic situation are beyond our control, and that we've delayed the price increase as long as possible. We have also kept the increase in price as low as we can and for the time being I'm pleased to say that subscription rates remain the same.

In return, you can be sure that in the coming months of 1992, *PW* will be bringing you some excellent constructional projects. We'll also be providing some very good reading in the easier-to-read format, combined with our much improved printing, paper and production standards.

73 DE
Rob Mannion
G3XFD

# Receiving You




Send your letters to the editorial offices in Poole. They must be original, and not duplicated in any other magazine. We reserve the right to edit or shorten any letter. The views expressed in letters are not necessarily those of *Practical Wireless*. The Star Letter will receive a voucher worth £10 to spend on items from our Book, PCB or other services offered by *Practical Wireless*. All other letters will receive a £5 voucher.

## ★★★ STAR LETTER ★★★

**Dear Sir**

I was delighted once again, to receive my first *Practical Wireless* of the New Year. I am enclosing a copy of the *Practical Wireless* for April 1966 to show readers the vast difference in the cost of the magazine. Just two shillings in ZL and half a crown in VK! Hope you enjoy reading the old *Practical Wireless* as much as I did.

I was quite intrigued by the letter in the January issue, from James Ramsay of Auckland. Before coming to VK land, my previous QTH was ZL. I read in the local paper that this gentleman was looking for any books on radio, so when clearing out my shack to come over here, I gathered a handful of radio books including my copy of the October *Practical Wireless*. I took them to him in the Waitakere Hospital.

He was delighted to receive everything, and we spent some time together and as lunch was about to be served I had to leave. So, by now I'm sure he must have quite a lot of reading material, and once again it shows how *Practical Wireless* gets around!

Congratulations on the excellent presentation of the new format of *Practical Wireless* and please note the difference between 1966 and 1992.

**Jim Munro**
**Queensland**
**Australia**

**Editor's reply: The *PW* team were very pleased to hear of the remarkable coincidence Jim. Thank you very much indeed for taking the trouble to visit and help James Ramsay in hospital. Hopefully, he's well on the way to a full recovery now, and as you say yourself Jim...it's amazing just where *PW* does get to, including the much travelled April 1966 issue you sent back. It surely must be one of the few *PW*'s to have completed a round trip from the UK to New Zealand, and return via Australia! Finally, I would like to remind all our readers with *PW*-related memories and stories, to send them them to us, for inclusion in the October Diamond Jubilee issue.**

Readers are reminded that we want **your** letters with memories of *PW*. The letters will be used in the October Diamond Jubilee issue (published September 10). Don't forget also, to send in your nominations for the *PW* 'Elmer' award.
(See *PW* January issue for full details).

**Dear Sir**

Sometimes we acquire articles which we cannot identify, may I suggest you run a 'What is it?' column in *Practical Wireless*.

The idea is that readers can send you particulars of the unknown items for identification either by *PW* staff or by readers. Possibly some items will spark further correspondence on history, theory and application, etc.

**John Davis**
**Bexhill-on-Sea**
**East Sussex**

**Editor's reply: Excellent idea John, send in those unusual items readers. (photo's only please, the lift in Enefco House couldn't manage to carry a large vintage induction coil!).**

---

**Dear Sir**

We often see letters in the amateur radio press complaining about the RSGB. At the last election, there were four vacancies for ordinary members. If we deduct, from a total of 13518 votes cast, the 'invalid' ones, and those used on the zone C election, and if we assume that each ballot paper used its four votes, then we find that around 3300 members of the RSGB were prepared to take the trouble to vote.

That is something like 10% of the membership. Thus, we may say 90% of the membership can't be bothered to vote. By extrapolation, 90% of the moans one hears as an RLO or when one is on the RSGB stand at a rally, must come from people who **DIDN'T VOTE** at the AGM, despite being given all the data, the form and the return envelope! You could argue that they are too lazy, (or too tight-fisted) to buy a stamp!

In future, whenever this particular RLO receives a query, he is going to start by asking whether the person voted at the last election!

**Paul Essery GW3KFE**
**Newtown**
**Powys**

---

**Dear Sir**

I am a regular reader of *Practical Wireless* and have been for many years, and have built many of your projects. Some have not received the final touch, i.e., incomplete front panels.

I would like to finish the job, but require some front panel signs, and wording. I know that many years ago I purchased a number of panel signs, but I'm not sure where from, it may have been *PW*, but I can't remember for sure.

I need dial signs and wording such as radio-amplifier, input, a.e., 'phones, speaker, etc. But as some of the panels I have are a bit on the rough side, I don't think the transfer signs, which are transferred by rubbing are suitable. I need the type where the backing is removed and the signs are self-adhesive. Do you know any possible supplier?

**A. J. Simmonds**
**Bexleyheath**
**Kent**

**Editor's reply: Apart from the mechanically embossed self-adhesive labels, done with a hand-held machine, I don't know of any suitable labels of this type available nowadays. There are many projects that could benefit from this sort of marking. Can readers help?**

**Dear Sir**

I am writing to say how much I enjoy reading the many articles in *Practical Wireless*. Now, with the new design, I look forward to future copies in this, your Diamond Jubilee year.

I have read *Practical Wireless* from the very early 1960s. As a school boy, I used to read the many articles and adverts on the ex-Government surplus equipment. Like most school boys of the day, I was limited by the cash available, (obtained from my part-time job) as to what equipment I could purchase. I had a 19 set, as new, from John's Radio of Bradford for around £2-10s (£2.50), those were the days!

I have seen 19 sets with a price tag today of over £100! A far cry from the early 1960s.

I welcome more articles on kit building and some of the kits that are available. Over the years, I have built up some of the many kits that were available, such as the famous Heathkit range, and others and I agree with the views found in the article 'Kit Building Special' in *Practical Wireless* January issue.

I must also say that when the Heathkit company were in the amateur radio market, they weren't cheap. But their assembly instructions and drawings were second to none, and the components of a very high quality.

I enjoy reading the reviews on modern transceivers, and I would hope to see more articles on some of those lovely old valve communications receivers and transmitters, such as the Eddystone receivers, along with articles on the surplus military equipment.

Some years ago in *PW*, there was a series called 'Going Back' by Colin Riches and Arthur Dow. It might be that other readers may have the information to be able to supply enough information for a future series?

I enjoy 'Competition Corner', and I am glad you accept photo-copies, as I do not like cutting my magazines about. I have entered every 'Wordsearch' competition and enjoy doing them, please carry on!

To finish on a final note, I like the better quality paper and extra colours, I look forward to receiving my next copy of *Practical Wireless*, I wonder what its 60th year will bring?

**Andrew Humphris**
**Hampton Magna**
**Warwick**

**Editor's reply: Thank you for your letter Andrew. My first transmitter-receiver came from a *PW* advert too! I was never keen on the 19 set (mind you they are quite collectable now!), but preferred the 18 set. Perhaps that's why I'm such a keen 7MHz operator nowadays! I'm looking into the possibility of doing a series of 'mini reviews' on 'classic' rigs, once I have found a reliable supply of equipment to review. We have to remember that older rigs will be helping newcomers to get on the air for a long time to come.**

**Dear Sir**

Yet another QRP 3.5MHz c.w. transmitter design has appeared in *PW*. I wonder what will be included next month, perhaps a 3.5MHz direct conversion receiver? I wouldn't be surprised!

I read other UK amateur radio magazines, and I am very disappointed with the current offerings. I also read magazines from the USA. What saddens me is the gulf between projects in these magazines and the UK publications. Are there no more people designing their own state-of-the-art equipment in the UK, or are they publishing their designs in overseas magazines?

I would very much like to improve my limited skills in r.f. design. I feel that a series of articles perhaps describing the complete design of a receiver and transmitter including all the necessary mathematical formulae, would be most useful in encouraging more people to progress in r.f. design.

It would help if you included the value of inductors in the circuits, together with their winding details. It would help people like me, to try to analyse the circuit for modification and incorporation into new designs, after all, there is no point re-inventing the wheel!

**R. Morrall**
**West Midlands**

**Editor's reply: Yes, as you probably saw Mr Morrall, we did publish a d.c. receiver design in February *PW*, as promised when we published the companion 'Challenger' transmitter. Although we have recently published some simple designs and projects, we've had some more advanced projects in the last year. We strive to keep a 'balanced' issue, and aim to have at least two constructional projects each month. This year we will present several, more advanced projects, including an interesting idea for v.h.f. Finally, I must say that we do seem to have a good response to the beginner and intermediate level projects. Perhaps more readers would like to respond, and tell us what they'd like to see in *PW*, we do listen you know!**

We are delighted to receive your letters, but do try to keep them short. It helps us, and makes it easier to get more letters in!

**Queries**

We will always try to help readers having difficulties with a *Practical Wireless* project, but please note the following simple rules:
1: We cannot give advice on modifications to our designs, nor on commercial radio, TV or electronic equipment.
2: We cannot deal with technical queries over the telephone.
3: All letters asking for advice must be accompanied by a stamped, self-addressed envelope (or envelope plus IRCs for overseas readers).
4: Make sure you describe the query adequately.
5: Only one query per letter please.

**Back Numbers & Binders**

Limited stocks of many issues of *PW* for past years are available at £1.65 each including post and packing.
Binders, each holding one volume of *PW* are available price £5.50 each (£1 P&P for one, £2 for two or more).
Send all orders to the Post Sales Department.

**Subscriptions**

Subscriptions are available both for the UK and overseas. Please see current issues for the latest prices.

**Constructional Projects**

Each constructional project is given a rating to guide readers as to its complexity.
**Beginner:** A project that can be tackled by a beginner who is able to identify components and handle a soldering iron fairly competently.
**Intermediate:** Some degree of experience in building electronic or radio projects is assumed, but only basic test equipment is needed to complete any tests and adjustments.
**Advanced:** A project likely to appeal to an experienced constructor and often requiring access to workshop facilities and test equipment for construction, testing and alignment. Definitely not recommended for a beginner to tackle on their own.
Components for our projects are usually available from advertisers. For more difficult items a source will be suggested in the article.
The printed circuit boards are available, mail order, from the Post Sales Department.

**Mail Order**

All *PW* services are available Mail Order, either by post or using the 24hr Mail Order Hotline (0202) 665524. Payment should be by cheque (overseas orders must be drawn on a London Clearing Bank). Access, Mastercard or Visa please.

Services

# Newsdesk '92

## Frankenstein Fan(g)s On The Air

It's a frightening but true fact, that both British and American people seem to be fascinated in the Frankenstein and Count Dracula stories. Despite the terrible tales of Vlad the impaler, well-known for skewering inept DXpeditions, the Wiesbaden Amateur Radio Club, DA1WA, held their first expedition to Castle Frankenstein in 1990, with a follow-up in 1991.

The group, and they claim they are completely sane, are returning to the ancient (and very creepy) castle near Darmstadt in 1992. Once they have the key and they are safe inside the castle, the door is locked!

They intend to be on the air from July 31 until August 1/2. The founding 'fiend' of the group is Robert Kipp DJ0PU (NR8V), accompanied by friends Mathias Poier DL5ZBM (NY8M) and Scott Scmith DA1SC (N4WQE). Between them the group will be operating all modes (including digital modes) during the DXpedition.

Further details about the event, and the blood-red souvenir QSL card depicting the castle and Frankenstein himself, are available direct from the dungeon of Robert Kipp DJ0PU, Hugelstrasse 25, D-6070 Langen, Germany.

## The Antique Wireless Newsheet

Subscription details for the *Antique Wireless Newsheet* are £6.00 for 12 issues UK and £7.00 for 12 issues overseas via airmail (including Eire). Further details from:

**The Vintage Wireless Company Limited**
**Tudor House, 20A Cossham Street**
**Mangotsfield, Bristol**
**Avon BS17 3EN.**
**Tel: (0272) 565472.**

## BBC Daventry - The End Of An Era

The final scheduled transmissions from the historic BBC h.f. transmitting station at Daventry, Northants, will take place on Saturday 28 March, when the current winter schedule ends. Most of Daventry's transmissions will be transferred to Woofferton, Shropshire, which now has surplus capacity with the reduction of Voice of America broadcasts.

There will be a final closing ceremony around midday on Sunday 29 March, when one of the transmitters will carry a special transmission, followed by an official switching off. Many BBC staff started their careers at Daventry, and a large number have been invited to the closing festivities.

The station has been on the air for 67 years, and to mark the occasion, a special amateur radio station, GB67XX, will operate on the h.f. bands for a few days after the closedown, using some of the large antenna arrays formerly used by the broadcast transmitters.

The BBC will still retain buildings on the site at Borough Hill, housing the mobile transmitter maintenance team, transmission department stores, and the BBC tape service unit. The club station, G5XX, will move to the site from the BBC Club in the town, so some h.f. transmissions will still originate from Borough Hill! One mast on the site will remain, but the remainder will be taken down, removing a well-known landmark. The land formerly occupied by the antenna arrays will be released for other uses.

Further details from:

**Richard Buckby**
**20 Eden Bank**
**Ambergate**
**Derby DE5 2GG.**
**Tel: (0773) 852475.**

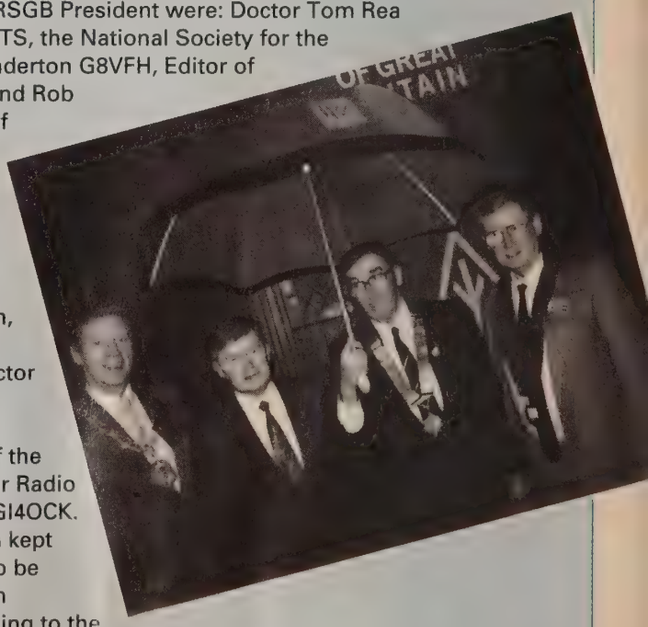
Please send in all of your news items to Sharon George at the editorial offices.

## RSGB Presidential Installation 1992

Despite the umbrella, it doesn't rain all the time in Ireland! Radio amateurs from all over the United Kingdom, Northern Ireland and Eire, attended the installation of Terry Barnes GI3USS, as RSGB President for 1992. Terry was installed during a ceremony in Bangor, County Down on January 11 and the 200 or so guests present at the celebration dinner, remained dry on the outside at least!

Accepting the Presidential Chain of Office from the retiring President, John Case GW4HWR, Terry Barnes made his acceptance speech. The speech confirmed his intention to improve communications between radio amateurs, and re-organise the RSGB's council for greater efficiency, with more meetings than before, and a more business-like approach. To this end, despite living in Northern Ireland, the new President stated that he intended to have an office at RSGB headquarters, and would be there every week.

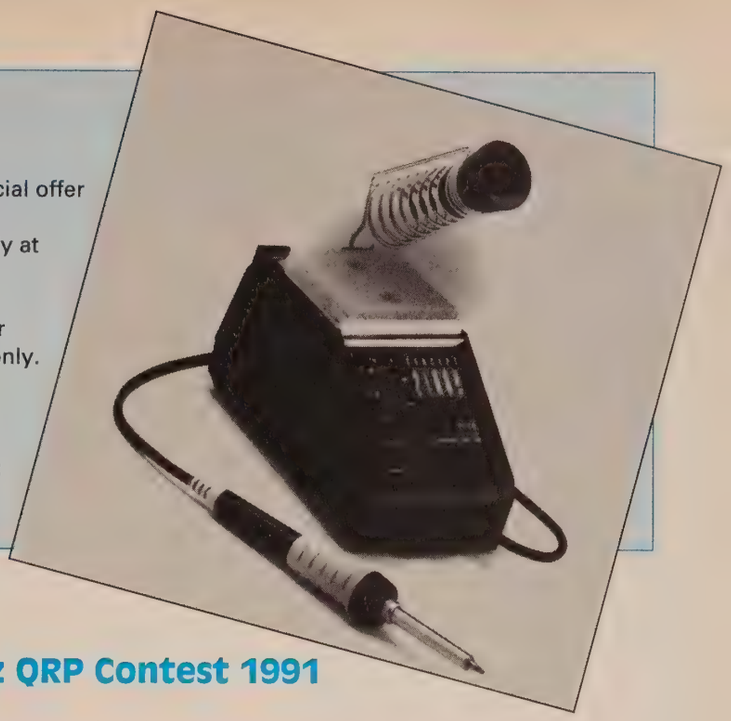
Among those attending the ceremony in the imposing Council Chamber in Bangor Castle, set above the seaside town, were the Mayor of North Down, Councillor Leslie Cree, and his Mayoress. Other guests supporting the well-known and popular new RSGB President were: Doctor Tom Rea EI2GP, President of the IRTS, the National Society for the Republic of Eire, Dick Ganderton G8VFH, Editor of *Short Wave Magazine*, and Rob Mannion G3XFD, Editor of *Practical Wireless*.



Sheltering under the RB2-11 size umbrella, presented by Martin Shardlow G3SZJ from Derby, were (left to right) The Mayor of North Down, Councillor Leslie Cree, President of The IRTS Doctor Tom Rea EI2GP, RSGB President Terry Barnes GI3USS, and Chairman of the Bangor & District Amateur Radio Society Stewart Mackae GI4OCK.

Although the umbrella kept the rain away, it proved to be ineffective against English weather! Everyone returning to the UK mainland had an interesting journey home as airlines struggled to cope with the fog-bound Heathrow and regional airports. However, this did not detract from the excellent hospitality, good food and 'traditional' Irish beverages that had been freely dispensed by the host amateur radio communities over the weekend. The occasion certainly left at least one visiting journalist with much food for thought and less pre-conceived ideas on Ireland and its people.

## Solder Station Special Offer



Ungar, the soldering and de-soldering specialist, has announced a special offer based on its ESD-safe, electronically-controlled 2110 solder station.

Not content with simply providing a value-for-money package (normally at just under £80.00 for a high performance station, tip leakage below 2mV, ceramic 60W 24V heater for rapid heat-up and recovery, adjustable temperature, soft, cool-grip handle, etc), Ungar have decided to make their 21100 available on a three-for-the-price-of-two basis, for a limited period only.

Pay for two Ungar 2110 solder stations and Ungar will send you three. Write to Ungar first for full details, but act quickly, as the offer won't last forever.

Enquiries about Ungar's solder station special offer should be made to:
**Ungar, Eldon Industries (UK) Ltd., Clifton Road Shefford, Beds SG17 5AB., Tel: (0462) 814914.**

## Encouraging Audiences for BBC World Service In India

New evidence confirming the continuing high level of listening to BBC World Service in India, has just been published.

Two recent surveys, one in urban India and the other in the north eastern state of Bihar, show that there is a large audience for broadcasts from London.

In the urban study, the BBC had a regular audience (people listening at least once a week) of 7.2% of all adults, more than ten million people. In the troubled state of Bihar, a separate study showed how listeners turn to the BBC when their need for reliable information is most acute.

The urban figure was obtained as part of the Indian National Readership Study, a massive survey carried out in 1990 by two leading Indian market research agencies which covered almost all of urban India. The BBC was second only to Sri Lanka Broadcasting Corporation amongst foreign stations, and well ahead of other international radio stations, such as Radio Pakistan (5.6%), Radio Moscow (1.3%) and Voice Of America (1.1%).

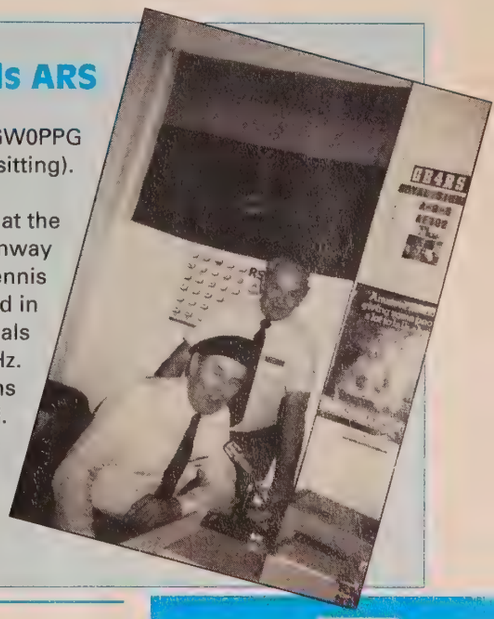
The Bihar study covered all parts of the state and was carried out in March and April this year, as part of the BBC's own continuous programme of specially designed media research in India. The research coincided with regional political unrest, the general election campaign and the end of the Gulf War. At this time, listening levels were much higher than found in the urban India study - a fifth (20.7%) of adults tuned in regularly to the BBC, more than for any other foreign station. The BBC was rated as the most trustworthy foreign broadcaster.

## PW 144MHz QRP Contest 1991

In the results of last year's *PW* 144MHz QRP Contest, published on page 19 of the November *PW*, and in the detailed results table distributed by post, the entry of the 'Windbreaker's Contest Group', G8HGN/P, was inadvertently omitted. Their 1785 points puts them in 23rd position - all entrants below this should be moved down one position. Sincere apologies from the adjudicator, G4HLX, for this error.

By the way, now is the time to be planning your activity for this year's QRP contest (the 10th anniversary event), which is on Sunday 21 June 1992 - look out for details on the contest and special prizes in *PW* soon.

## Royal Signals ARS



Pictured here are Syd Richards GW0PPG (standing) and Dennis Egan GW4XKE (sitting).

The photograph was taken at the Llandudno rally, held at the Aberconway Centre last November. Syd and Dennis were running the Royal Signals stand in the club room and had GB4 Royal Signals Llandudno on the air on h.f. and 144MHz. They send their thanks to all the stations who called them over the period. If all goes well, they hope to be back at the same venue next year. Photo by Taizo Arakawa JA3AER.

## Children In Need

Six young amateurs from Old Swinford School in Stourbridge, have ...sed over £135 for the recent appeal for Children In Need. A sponsored radio event was held using th... ecial event call GB2OSH, and many bands were used during the day, with at least two contacts with ot... fund-raising stations. The average age of those transmitting was 15 years, and all were B licensees o...erating under the care of Clive Williamson G4IEB, who is a teacher in charge, and the holder of the schoo... llsign G4CVK.

This was the fourth year that funds have been raised for this charity, an... rings the grand total to over £400. The activity was an opportunity for three student Novice amateurs, Si...on, Michael and Mark, to log and operate the station giving the two minute greetings message. These thr... boys are at present awaiting the results of their December Novice exam.

The school has been operating on amateur radio for 22 years and enters several contests, as well as running special event stations for school open days and JOTA. Needless to say, all these activities have lead to many past pupils gaining their radio 'ticket', and a well-equipped shack is located in the main teaching block topped by a variety of antennas.

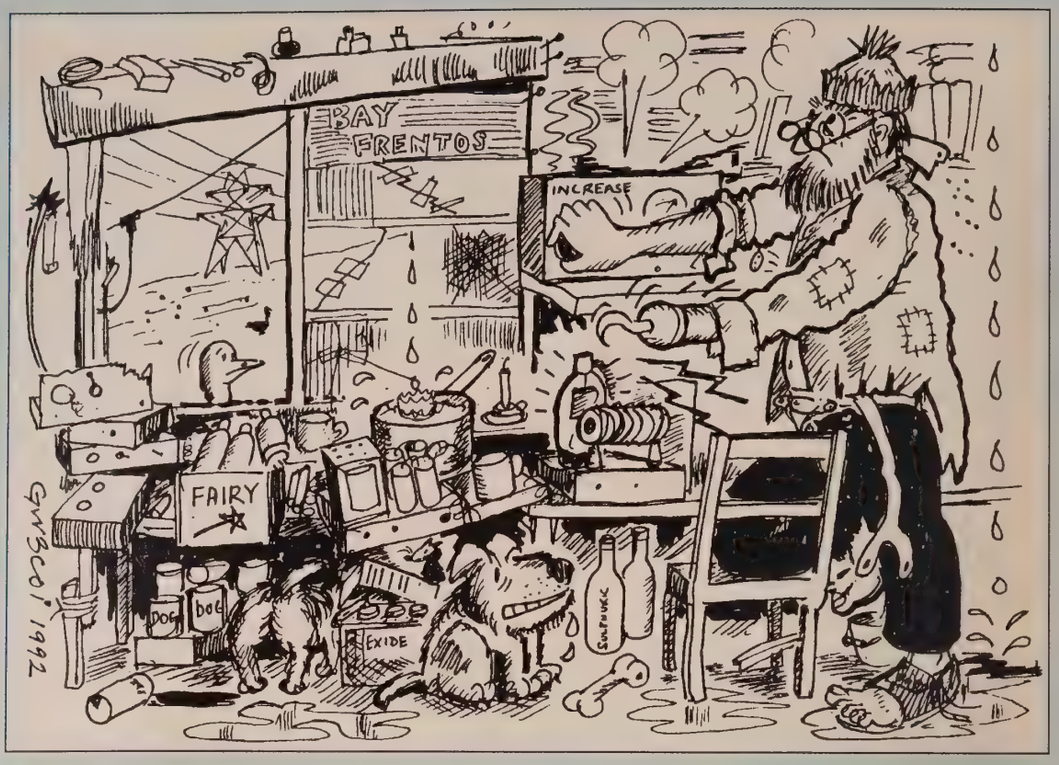
Their DXCC was gained in 1988, and since then the main operating areas in the last few years has been computer operated RTTY. Since September, several pupils have been attending Morse classes, and one other is awaiting the results of the recent RAE.

For the future, the society would like to try some satellite working and are looking for someone in the West Midlands to give them some help.
**Clive Williamson on (0384) 392006.**

Newsdesk 92

Competition Corner

# SPOT THE DIFFERENCE



## PRIZES

First prize winner can choose either a one year *PW* subscription or £20 worth of vouchers for the book service.

The two runners-up can choose from either a six month *PW* subscription or £10 in book vouchers.

**Safety in the shack! This month's theme. See 'Keylines'.**

Circle the 12 differences, fill in the form below and send your entry to PW Publishing Ltd., March 1992 Spot The Difference Competition, Enefco House, The Quay, Poole, Dorset BH15 1PP. The Editor's decision on the winner is final and no correspondence will be entered into. Closing date is Friday 27 March 1992.

Please note that we do accept photocopies for this competition, but you still have to send in this corner flash with your entry as proof of purchase. Good luck.

Name .....

Address .....

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❑ Subscription

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Competition Corner March 92

# S.R.P. TRADING

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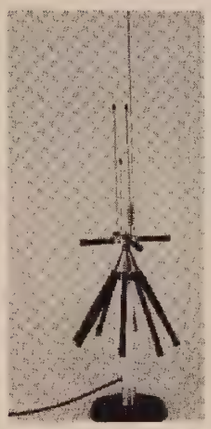
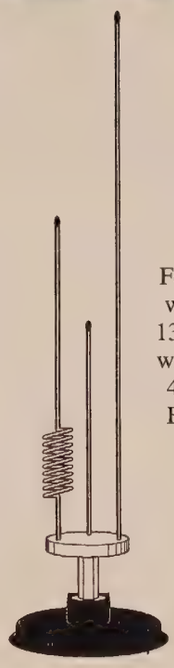


**£49.00** + £3.00 p&p



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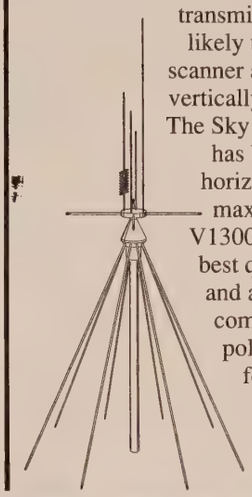

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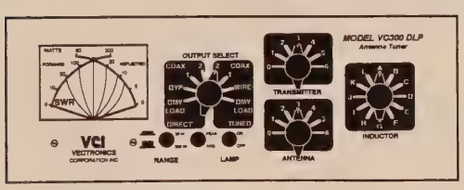


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| Self-amalgamating tape | 4.35 | 1.00 |
| 300 R slotted feeder, per metre | .58 | .10 |
| 450 R slotted feeder, per metre | .50 | .10 |
| URM67 50R low loss coax per metre | .95 | .25 |
| URM76 50R coax, per metre | .40 | .10 |

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| T20 | 14MHz traps 1kW (pair) | 39.90 | 2.50 |
| T40 | 7MHz traps 1kW (pair) | 41.90 | 2.50 |
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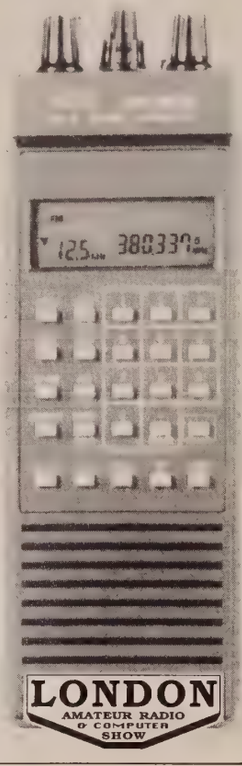


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ACCESS VISA

# Radio Diary

Practical Wireless and Short Wave Magazine in attendance at rallies marked *. Meet the staff, purchase back issues and technical books (save postage and packing charges).

**February 16**: The Welsh Mobile radio rally will be held at the Barry Leisure Centre, off Holton Road, Barry, South Glamorgan. Doors open 10.30am and 10am for disabled visitors. There are trade stands, Bring & Buy, refreshments and free parking. Swimming pool available. Talk-in on S22 GW4BRS. For further details, contact **Peter GW0BAH on (0656) 788502.**

**February 23**: The Kidderminster & DARS rally will be held at the Harry Cheshire School, Habberley Road, Kidderminster, Worcs. Doors open 10am. **G8JTL. Tel: (0384) 894019.**

**February 23**: The Northern Cross rally will be held at the Rodillian School on A61 between Leeds and Wakefield (junction M1/M62). Doors open 11am, disabled 10.30am. On-site parking, dealers, groups and craft stands, Bring & Buy, Morse test. Car crime prevention demo. Bar & refreshments. Talk-in S22. Entry 50p (programme draw prizes). **Dave Gray G0FLX on (0532) 827883.**

**February 29**: Tyneside ARS have arranged a new venue for their annual rally, at the Temple Park Leisure Centre in South Shields, Tyne and Wear. The centre offers up to 18 000 square feet of floor space, all on one level, with easy access for traders where needed. Catering facilities, including a bar on site, as well as family rooms. For those other members of the family not wishing to partake in the Rally, all the amenities of the Leisure Centre are available, including heated leisure pool and gymnasium. Plenty of free parking. Further details about the Rally from **Jack G0DZG on 091-265 1718.**

**March 7 & 8**: The London Amateur Radio Show will be held at Picketts Lock Centre, Picketts Lock Lane, Edmonton, London N9.

**March 15**: Wythall RC will be holding their annual rally at Wythall Park, Silver Street, Wythall (nr. Birmingham). Doors open 11am to 5pm. Usual traders, bar and refreshment facilities, Bring & Buy. Talk-in S22. Admission 50p. Full details from **Chris G0EYO on 021-430 7267.**

**March 15**: Tiverton South West Radio Club Mid-Devon rally will be held at the Pannier Market, Tiverton. Easy access, only minutes from junction 27 on the M5. Free parking. Two halls of trade stands, Bring & Buy stall and mobile snack bar. Further displays and full refreshment facilities in the club room bar, which is to open throughout the day. Doors open 10am. Talk-in on S22. More details from **G4TSW, Mid-Devon Rally, PO Box 3, Tiverton, Devon.**

**March 22**: Pontefract & DARS have their annual Components Fair & Spring rally at Carleton Community Centre, Carleton, nr. Pontefract. Doors open 11am to 4.30pm. Admission by prize programme. Bring & Buy, traders, licensed bar, bookstall, etc. Talk-in on 144MHz. Car boot spaces available. Extra car parking. Details from **G0NQE on (0977) 677006 or from G0AAO (0977) 643101.**

**March 29**: Bournemouth Radio Society's 5th annual Amateur Radio, Electronics and Computer Sale will be held at Kinson Community Centre, Pelhams, Millhams Road, Kinson, Bournemouth. Doors open 11am. Admission is 50p, including prize draw ticket. Light refreshments available. Talk-in on S22. For further details of table bookings, etc., contact **Vic G4PTC on (0202) 516593 evenings after 6pm.**

**April 5**: The Launceston 6th amateur radio rally will be held at Launceston College. Doors open 10.30am. **Maggie. Tel: (0409) 21219.**

**April 19**: Centre of England Easter Sunday Radio & Electronics rally will be held at the National Motorcycle Museum, Bickenhill, near the NEC (Jct. 6 M42). Doors open 10.30am, 10am for disabled visitors. Admission £1 (concession for RAIBC members and senior citizens). Over 60 traders, ample free parking, bar & restaurant facilities. Talk-in S22. Easter special: 'Spot The Egg' on many of the trade stands to win an easter egg. Details from **Frank Martin G4UMF on (0952) 598173.**

**April 26**: The Bury Radio Society are holding their annual rally/Hamfest at 'The Castle Leisure Centre', Bolton Street, Bury, Lancashire. More details from **Laurence Jones G4KLT on 061-762 9308.**

**May 4**: Dartmoor Radio Club rally is to be held at St. Pauls Church Hall, Yelverton. Doors open at 10.30am. Free parking, usual traders, refreshments, Bring & Buy. Details from **George Spray on (0822) 853885.**

**May 17**: The 35th Northern mobile rally will take place in the Flower Show Hall at the Great Yorkshire Showground, Harrogate, north Yorkshire. Showground opens 10am, doors open 10.45am. Talk-in on S22. Bring & Buy, bar and cafeteria. Free parking and loads of stands. Entry and parking of Wetherby to Harrogate Road. Separate arrangements for disabled visitors off Hookstone Wood Road. Details from **Mike G0MKK on (0423) 564353/507653 or FAX (0423) 520992 or @GB7CYM.**

**June 7**: The Northampton Radio Club will again be holding their Radio Computer & Electronics rally at the rear of the 'Red Lion' public House, (500 yards from junction 16 of the M1 motorway). This year there will be room for four times more stalls, as they have booked an extra field just for parking. Doors open 10am. Pub and cafe will be open all day. Talk-in on S22 and on GB3NH (RB3) and 1.933MHz. All enquiries to **Paul Young on (0327) 41267.**

***June 14**: Royal Naval ARS have their annual mobile rally at HMS Mercury, Nr. Petersfield, Hants. There will be dozens of trade stands; a Bring & Buy; flea market; radio-controlled power boats and trains; local radio clubs and repeater groups; childrens' rides and amusements; vintage fire engine; TV detector van; ices and refreshments; arts and crafts' exhibition; two Grand raffles; spectacular arena displays and other attractions, making this a great day out for all the family. Talk-in on 144 and 430MHz, free parking and picnicking, free admission for children, adults £1.50, no dogs except guide dogs. For full details, contact **Cliff Harper G4UJR, 34 Neva Road, Bitterne Park, Southampton SO2 4FJ. Tel: (0703) 557469.**

**June 21**: Denby Dale & District ARS will be holding their rally at Salendine Nook High School, Huddersfield. Easy access from M62, junction 23 eastbound, junction 24 westbound. Doors open 11am. Usual traders, craft stalls, etc. Bar, catering, car boot sale, Bring & Buy, ample parking. Talk-in S22 and SU22. Details from **Philip G4FSQ on (0484) 644827.**

**June 28**: The 35th Longleat amateur radio rally. Details from **Shaun G8VPG on (0225) 873098.**

**June 28**: The Bromsgrove ARS will be holding their second Mobile Radio Ham rally & Car Boot Sale at the Lower Wick Country Fair, the location being on the Worcester to Malvern Road, rear of Bennetts Dairy. Doors open 9am to 6pm. Tables for Boot Sale are £4. Entry to fair & rally is £1 per person. Details from **Dave Edwards G4ZWR on (0527) 546075.**


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## SO DON'T MISS THE DAYTON '92 HAMVENTION HOLIDAY!

***Last year's trip to Dayton '91 was a resounding success, and readers have clamoured for more. So, here we are again, inviting you to come and fly with us to Dayton Ohio, home of the HamVention. Enjoy yourself at the biggest amateur radio show in the world. Reserve your seat now...we really don't want to leave you behind!***

### *Five Nights In Dayton*

The Dayton '92 holiday starts at Gatwick airport on Wednesday 22 April, when we fly to Charlotte in North Carolina. After changing aircraft in Charlotte, we fly straight into Dayton. When we arrive, accommodation is no problem, as we'll be staying for five nights in the Day's Inn in the heart of downtown Dayton.

Our stay gives you plenty of time to explore the giant HamVention and many of the local attractions.

We'll be returning home via Charlotte on Monday 27, but we can also arrange extended stays and there's even a special extra holiday in Florida available to tempt you further!

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The cost of this superb opportunity is £579.95 per person. But don't worry, you only have to pay out £75 now to reserve your seat, with the balance payable before departure.

### *Want To Know More?*

**If you want to know more, you can call Roger Hall G4TNT on 071-731 6222,** for further information anytime during the day, evening or weekends. **Alternatively, you can call *PW*'s Editor, Rob Mannion G3XFD, during the day Monday to Friday on (0202) 678558.** Rob led our party on the Dayton '91 holiday, and he'll be glad to talk about the trip, the excellent food and the wonderful time everyone had at the HamVention. You'll be able to join Rob and enjoy the fun on the '92 trip, if you book now!

**Send your cheque for the £75 deposit to: Dayton '92 HamVention Holiday, PW Publishing Ltd, Enefco House, The Quay, Poole, Dorset BH15 1PP.**

# Club News

**Aylesbury Vale RS** meet 1st & 3rd Wednesdays, 8pm in the Village Hall at Hardwick. March 4 is a new equipment demonstration, by AKD Products. Further details about the club from **Martin G4XZJ on (0296) 81097.**

**Barr Beacon RC** meet 1st Mondays and 3rd Wednesdays, 7.30pm at 112 Walsall Road, Aldridge, West Midlands. For further details, ring **(0922) 36162.**

**Barnsley & District ARC** meet Mondays in the radio club room and shack, at the rear of the Darton Hotel, Station Road, Darton, Barnsley. For further information, ring **Ernie G4LUE on (0226) 716339.**

**Basingstoke ARC** meet 1st Mondays, 7.30pm at the Forest Ring Community Centre, Sycamore Way, Winklebury, Basingstoke. For further details, please contact **John Randall G3OAZ, 243 Paddock Road, Basingstoke, Hants RG22 6QP.**

**Bedford & District ARC** meet Thursdays, 8pm in the Allen Club, Hurst Road, Bedford. More details from **Gavin Carmichael, 15 Evesham Court, Avon Drive, Bedford MK41 7AJ. Tel: (0234) 365660.**

**Bradford ARS** meet 2nd & 4th Thursdays, 8pm at the Polish Ex-Service Club, Shearbridge Road, Bradford, West Yorkshire. February 13 is Display & Discussion - bring your home-brew equipment, the 27th is a Quiz night and March 12 is a social evening. **Charles Bolt G0ACX on (0247) 494694.**

**Braintree & District ARS** meet 1st & 3rd Mondays, 8pm at the Community Centre, Victoria Street, Braintree. **M. Andrews, 22 Arnhem Grove, Braintree, Essex CM7 5UQ. Tel: (0376) 27431.**

**Brighton & District ARS** meet 1st & 3rd Wednesdays, 7.45pm at the Roast Beef Bar, Brighton Racecourse, Elm Grove, Brighton. More details from **Harold Lunson G3WR, 17 Tongdean Rise, Brighton, East Sussex BN1 5JG. Tel: (0273) 501100.**

**Bromsgrove & District ARC** meet Fridays at Avoncroft Arts Centre, South Bromsgrove, Worcester. February 14 is Question & Answers (Team). More details from **Joe Poole G3MRC on (0562) 710010.**

**Bromsgrove ARS** meet at Lickey End Social Club, Alcester Road, Burcot, Bromsgrove. **Mr D. Edwards G4ZWR, 2 Mason Close, Headless Cross, Redditch, Worcs B97 5DF. Tel: (0527) 546075.**

**Bury RS** meet Tuesdays, 8pm in The Mosses Community Centre, Cecil Street, Bury, Lancashire. 2nd Tuesdays are Lecture/Talk nights and other Tuesdays are general natter nights with the club's 'new' rigs on the air. More details from **Colin Fox G3HII, 'The Lair', 5 Pinewood Crescent, Holcombe Brook, Ramsbottom, Bury BL0 9XE. Tel: (0204) 883212.**

**Chelmsford ARS** meet 1st Tuesdays, 7.30pm at Marconi College, Arbour Lane, Chelmsford, Essex. More details from **Roy & Ela Martyr G3PMX & G6HKM, 1 High Houses, Mashbury Road, Great Waltham, Essex CM3 1EL. Tel: (0245) 360545.**

**Conwy Valley RC** meet 1st Thursdays, 7.15pm at The Studio, Penrhos Road, Colwyn Bay, Clwyd. March 5 is a talk by John Lawrence GW3JGA on '24cm Amateur TV'. For further details, contact **Merfyn Jones GW4NNL, 72b Princes Drive, Colwyn Bay, Clwyd LL29 8PW. Tel: (0492) 530725.**

**Cornish RAC** meet at the Memorial Hall, Perranwell Station, Perranwill, nr. Truro, 7.30pm. For further information, please contact **Mr G. Bate, 9 Tresithney Road, Carharrack, Redruth, Cornwall TR16 5QZ. Tel: (0209) 820836.**

**Coulsdon ATS** meet 2nd Mondays, 7.45pm at St. Swithun's Church Hall, Grovelands Road, Purley, Surrey. March 9 is 'The UFO Phenomena' by Lesley Baker G8JIC. **Andy Briers G0KZT on (0737) 557198.**

**Coventry ARS** meet Fridays, 8pm at Baden Powell House, 121 St. Nicholas Street, Radford, Coventry. For further details phone **Jon on (0203) 610408.**

**Denby Dale & District ARS** meet at Pie Hall, Denby Dale, nr. Huddersfield, 8pm. March 4 is a talk on 'Concept In Design' by Denis Moth. More details from **Ivan Lee, Clayton Lodge, Sunnyside, Edgerton, Huddersfield HD3 3AD.**

**Derby & District ARS** meet Wednesdays, 7.30pm at 119 Green Lane, Derby. February 19 is 'Building A Motorway' - an illustrated talk by Mr Black of Tarmac Construction and March 3 is a Junk Sale. More details from **Richard Buckby G3VGW, 20 Eden Bank, Ambergate, Derby DE5 2GG. Tel: (0773) 852475.**

**Derwentside ARC** meet Wednesdays, 7.30pm in the Steel Club, 36 Medomsley Road, Consett, County Durham. Regular talks by amateurs and non-amateurs. Construction work overseen by Don G4LGA. Further details from **Geoff Darby G7GJU, 60 Pine Street, Grange Villa, Chester-le-Street, County Durham DH2 3LX. Tel: 091-370 2032.**

**Dragon ARC** meet 1st & 3rd Mondays, 7.30pm at the Four Crosses Hotel, Menai Bridge. February 17 is 'A Technical Demonstration' by Stewart Rolfe GW0ETF and March 2 is 'The Great Welsh Wireless Station' by David Last GW3MZY. **Tony Rees GW0FMQ on (0248) 600963.**

**Dundee ARC** meet Tuesdays, 7pm in the College of Further Education, Graham Street, Dundee. February 18 is a Construction night, the 25th is 'Police Control Room', a lecture by Neil Harvery GM0NLU, March 3 is a Construction night and the 10th is a Members' Night - with mini lectures by members. Further details from **George Millar GM4FSB, 30 Albert Crescent, Newport-on-Tay, Fife DD6 8DT.**

**Dunstable Downs RC** meet Fridays, 8pm at Chews House, 77 High Street South, Dunstable, Beds. On February 21 they have a Junk Sale and March 6 is an Official Open Evening of new premises. Further details from **Wendy Jefferson on (0582) 451057.**

**Echelford ARS** meet in the Community Hall, St. Martin's Court, Kinston Crescent, Ashford, Middlesex, 7.30pm. February 13 is 'Linear Amplifiers' by John Stockley G8MNY, the 27th is a Construction Contest evening - bring you latest project and March 12 is 'When The Balloon Goes Up' by Ian Jackson G8RWH (RAYNET). Further details from **P. Townshend G6PMT on (0344) 843472.**

**Fareham & District ARC** meet Wednesdays, 7.30pm in Portchester Community Centre, Westlands Grove, Portchester, Fareham, Hants. Details from **Rod Smith G0ERS on (0705) 373572.**

**Fylde ARS** meet 2nd & 4th Thursdays, 7.45pm at South Shore Lawn Tennis Club, Midgeland Road, Blackpool. **Eric Fielding G4IHF on (0253) 726685.**

**Glenrothes & District ARC** meet in their clubrooms, Provosts Land, Leslie, Fife, 8pm. February 26 is a talk by Tony McElroy GM8KSQ on 'Frequency Synthesis' and March 11 is a talk by Alan Ayre of the Glenrothes branch of the Ordnance Survey, entitled 'The Work Of The Ordnance Survey'. Further details from **John Hardwick GM4ALA on (0592) 742763.**

**Gloucester ARS** meet at St. John Ambulance HQ, Heathville Road, Gloucester at 7.30pm. March 4 is a G4HAQ talk on 'Kites' and the 11th is Home-brew Clinic. Further details from **Jenny Beckingham G7JUP on (0452) 528533 Ext. 2733.**

**Grafton RS** meet 2nd & 4th Wednesdays, 8pm in Holy Trinity Club Hall at the rear of Holy Trinity Church, Granville Road, London N4. Further details from **Rod G0JUZ on 081-368 8154.**

**Great Lumley AR&ES** meet Wednesdays, 8pm at Great Lumley Community Centre, Great Lumley, Nr. Chester-le-Street, Co. Durham. For more details, contact **Barry G1JDP on 091-388 5936.**

**Halifax & District ARS** meet 1st & 3rd Tuesdays, 7.30pm at the Running Man Public House, Pellon Lane, Halifax. February 18 is a Junk Sale. For further details, contact **David Moss G0DLM, Beechwood Lodge, Leeds Road, Lightcliffe, Halifax, West Yorkshire HX3 8NU. Tel: (0422) 202306.**

**Hambleton ARS** meet in Room A5 of Northallerton Grammar School at 7.30pm. February 17/March 2 are RAE classes and March 9 is a Visit to RAF Leeming Weather Centre. For more details, contact **Nigel Robertshaw G0NHM on (0609) 776608.**

**Horndean & District ARC** meet 1st Thursdays, 7.30pm at Horndean Community School, Barton Cross (off Catherington Lane), Horndean, Hants. March 5 is a Junk Sale. For more information, contact **Stuart Swain, 35 Mavis Crescent, Havant, Hampshire PO9 2AE. Tel: (0705) 472846.**

**Hornsea ARC** meet Wednesdays, 8pm at the Mill, Atwick Road, Hornsea. February 19 is 'Meters' by Jeff G4IGY, the 26th is 'Obtaining A PPL' by Norman G4NJP, March 4 is 'History Of Callsigns' by Percy G4DC and the 11th is 'Air Experience' by Duncan G3TLI. Further information from **Jeff G4IGY on (0964) 533331.**

**Horsham ARC** meet at the Guide Hall, Denne Road, Horsham, West Sussex, 8pm. On March 5 they have a Surplus Equipment Sale. Further details from **Peter Stevens G8SUI, 11 Nutwood Avenue, Brockham, Betchworth, Surrey RH3 7LT. Tel: (0737) 842150.**

**Ilford Group RSGB** meet Sundays at 7pm. They do not teach, but will fully answer any questions that members ask. They offer training and guidance on how to build and test electronic equipment, training on the safe use of tools, and how to solder, with full use of all test equipment. Members are encouraged to build equipment, which they can do in the workshop. The club takes part in NFD each year. For further details, please contact **J. Hooper on 081-478 3741.**

**Ipswich RC.** Contact **Mrs S. Elden G8HYE, 124 Larchcroft Road, Ipswich IP1 6PQ.**

**Keighley ARS** meet at The Cricket Club, Ingrow, Keighley, 8pm. February 20 is a natter night, the 27th is 'The HF Spectrum & Its Inhabitants' by G3LEQ, March 5 is a natter night and the 12th is a night on the air G0KRS & G7KRC. Further details from **Kathy Conlon G1IGH on (0274) 496222.**

**Kettering ARS** meet Tuesdays, 7.30pm at the Electricity Sports & Social Club, Eksdale Street, Kettering. All enquiries to **Len G7EHM on (0536) 514544.**

**Kidderminster & District ARS** meet alternate Tuesdays, 8pm at The Queens Head, Wolverley, Worcestershire. For more details contact **Geoff Philpotts G7JIR, 62 Erneley Close, Stourport-on-Severn, Worcs DY13 0AH. Tel: (0299) 379229.**

**King's Lynn ARC** meet Thursdays, 7.30pm at the 19th King's Lynn Scout HQ, North Runcton. Further details from **Derek Franklin G0MQL on (0553) 841189.**

**Lothians RS** meet on the 2nd & 4th Wednesdays, 7.30pm in the Orwell Lodge Hotel, Polwarth Terrace, Edinburgh. Further details from **Mel Evans at 56 Southhouse Road, Edinburgh EH17 8EU or telephone 031-664 5403.**

**Loughton & District ARS** meet in Room 14 of Loughton Hall, 7.45pm. For more details contact **Mike Pilsbury G4KCK on 081-504 4581.**

**Maidenhead & District ARC** meet at The Red Cross Hall, The Crescent, Maidenhead, 7.30pm. February 18 is EMC and March 5 is Quiz at home against Reading ARC. Details from **Neil G8XYN on (0628) 25952.**

**Mansfield ARS** meet at the Polish Catholic Club, off Windmill Lane, Woodhouse Road, Mansfield. March 5 is a talk by Dennis G0KIU on 'Radar'. Further information from **Mary G0NZA on (0623) 755288.**

**Milton Keynes & District ARS** meet 2nd Mondays at North Bucks Youth Sports Hall, Haversham Road, Wolverhampton, Milton Keynes. February 15 is their Annual Club Dinner and March 9 is a talk on the 'Radiocommunications Agency', how the department works. For more information, please contact **Julian Winson G3FGB on (0908) 611005.**

**Morecambe Bay ARS** meet every other Tuesday, 7.30pm at the Trimpell Sports & Social Club, with Morse instruction each Tuesday during club meetings. For more details, please contact **J. Burrow G0NYD, 36 Longfield Drive, Cragbank, Barnforth, Lancashire LA5 9EJ. Tel: (0524) 733212.**

**Nelson & District ARS** meet Wednesdays, 7pm at Llancaiach School Nelson. They also run a c.w. class at their meetings. Anyone wishing to find out further information is welcome to call in, or otherwise contact **Leighton Smart GW0LBI at 33 Nant Gwyn, Trelewis, Mid-Glamorgan, Wales CF46 6DB. Tel: (0443) 411736.**

**Norfolk ARC** meet Wednesdays,

7.30pm at 'The Norfolk Dumpling', The Livestock Market, Harford, Norwich. February 19 is 'Science For All' by Arnold Tomalin G3PTB, the 26th is an informal & night on the air, March 4 is 'Simple HF Antennas & ATUs' by Stuart Line G3XYO and the 11th is a 'Real Radio' evening. **Jack Simpson G3NJQ on (0603) 747992**.

**North Bristol ARC** hold their meeting at S.H.E., 7 Braemar Crescent, Northville, Bristol. **Chris Budd G0LOJ on (0454) 616267.**

**Nottingham ARC** meet Thursdays, 7.30pm at the Sherwood Community Centre, Mansfield Road, Nottingham. February 13 is a series of mini-talks on 'Receivers', the 20th is a WAB Activity and Construction evening, the 27th is a talk on 'Fuses' by Simon G0IEG, March 5 is Forum and the 12th is a talk on 'Packet Radio For Beginners' by a beginner, Mike G2SP. Further details from **Rex Beastall G1LRI on (0602) 733740.**

**Poole RAS** meet 2nd & last Fridays, 7pm at Lady Russell-Coates House, Lower Constitution Hill Site, Bournemouth & Poole College of FE. February 14 is 'Radio Astronomy' by Peter Werba G7FXO and the 28th is On the Air, construction projects and c.w. practice. More details from **Vernon Cotton G3BCI, 45 Branksome Hill Road, Bournemouth, Dorset BH14 9LF. Tel: (0202) 760231.**

**Prudential ARS** is open to all employees and ex-employees of the Prudential companies. Those interested overseas should contact **Alan McCullock ZS6KU, PO Box 2291, Helderkuin, 1733, South Africa.** Those in the UK can contact **Dennis Egan GW4XKE, 4 Hazel Grove, Longmeadow, Dinas Powis, South Glamorgan CF6 4TE. Tel: (0222) 512959**.

**Reading & District ARC** meet 2nd & 4th Thursdays, 8pm at The Woodley Pavilion, Woodford Park, Haddon Drive, Woodley, Reading. February 13 is '3 Towers Hike' briefing by John Linford G3WGV, plus club construction project discussion by Jim Carter G0LHZ, the 22nd is a Special Event, help with Girl Guides Thinking Day, the 27th is 'RADARC, The Way Ahead' - open forum Nick Challacombe G0LGG, March 5 is a Club Quiz at Maidenhead Club and the 12th is 'British WWII Radio Design' by Charles Boville & Russel Rixon G8ORE. **More details from Vin Robinson G4JTR, 4 Hilltop Road, Caversham, Reading RG4 7HR**.

**Rochdale & District ARS** meet Mondays at T. S. Frobisher, Greenbank Road, Rochdale. February 17 is Airband Communications, the 24th is a construction night and March 2 is a Theory night - modulation methods. Further details from **Brian on 061-653 8316 or Dave (0706) 32502.**

**Rhyl & District ARC** meet 1st & 3rd Mondays. March 2 is a Viewing Video of club activities. For more details, contact **Ken Padley GW7IAR, 67 Rosehill Road, Rhyl, Clwyd LL18 4TS. Tel: (0745) 338276.**

**Salisbury Radio & Electronics Society** meet Tuesdays, 7.30pm at Grosvenor House Centre, Churchfields Road, Salisbury. For further details, contact **Bert Newman G2FIX on (0722) 743837.**

**Sevenoaks & District ARS.** Details from **The Secretary, c/o Sevenoaks District Council, Council Offices, Argyle Road, Sevenoaks, Kent TN13 1HG.**

**Shefford & District ARS** meet Thursdays, 8pm at the Church Hall, Ampthill Road, Shefford, Bedfordshire. For further information, contact **Nigel G1JKF on (0908) 274473.**

**Silverthorn RC** meet Fridays, 7.30pm at The Chingford Community & Adult Education Centre, Friday Hill House, Simmons Lane, Chingford, London E4 6JH. More details from **Andrew Mowbray G0LWS on 081-529 4489 between 5.30 and 6.30pm weekdays only.**

**Solihull ARS** meet 3rd Thursdays in The Shirley Centre, 274 Stratford Road, Shirley, Solihull, West Midlands. For more details, contact **Colin Taylor G3USA, 231 Robin Hood Lane, Hall Green, Birmingham B28 0DH. Tel: 021-777 9965 evenings or (0827) 53344 daytime.**

**South Dartmoor ARC** meet Mondays, 8pm at South Dartmoor School, Balland Lane, Ashburton, Devon. This radio club has a committee of only one adult - the rest being school-age youngsters! Although anyone wishing to join in is welcome. For more details on this Novice-run radio club, contact **Peter Thornhill G6ZKQ, 21 Elmbank, Buckfastleigh, Devon TQ11 0DX. Tel: (0364) 43433.**

**South Dorset RS** meet 1st Tuesdays, 7.30pm in the Wessex Lounge of Weymouth Football Club. March 3 is a Bring & Buy. **Geoff Gwillian G4FJO, 13 Overlands Road, Wyke Regis, Weymouth DT4 9HS. Tel: (0305) 781164.**

**South Notts ARC** meet at Highbank Community Centre, Farnbrough Road, Clifton Estate, Nottingham. On February 13 they have a Construction evening, the 20th is a talk-in (S22) and talk by the RIS and the 27th is On the Air. For further details contact **Ray G7ENK on (0602) 841940.**

**Southgate ARC** meet at Winchmore Hill Cricket Club Pavilion, Firs Lane, Winchmore Hill, London N21. February 27 is a Club Visit & Lecture on 'The Hazards Of RF Energy', at Kings College, London, March 7/8 is Southgate ARC at Picketts Lock, running the enormous Bring & Buy of the London Amateur Radio & Computer Show and March 12 is a talk by Mike Dennison G3XDV, from the RSGB. **Brian Shelton G0MEE, 22 Berkeley Gardens, Winchmore Hill, London N21 2BA. Tel: 081-360 2453.**

**Spalding & District ARS** meet Fridays, 8pm at The Riverside Centre, The Old Fire Station, Double Street, Spalding, Lincolnshire. Further details from **David Johnson, 65 West Street, Bourne, Lincolnshire PE10 9PA. Tel: (0778) 425367 (6-7pm).**

**Spen Valley ARS** meet Thursdays, 8pm in Old Bank Working Men's Club, Mirfield. Alternate Thursdays are 'Noggin & Natter nights'. Further details from **Ian Barraclough G7DWY on (0484) 716453, early evening.**

**Stevenage & District ARS** meet in Ground Floor Rear Suite, Sitec Building, Ridgemond Park, 7.30pm. February 19 is a talk on 'Contest Operating & Awards' and the 26th is Construction projects. More details from **Pete Daly G0GTE, 48 Lincoln Road, Stevenage, Herts SG1 4PJ. Tel: (0438) 724991.**

**Stirling ARS** meet Thursdays, 7.30pm at premises near Throsk, Stirling. Details from **Brian Mulleady GM0KWL, QTHR or on (0324) 36235.**

**Stockport RS** meet 2nd & 4th Wednesdays, 7.45pm in Room 14 of the Dialstone Centre, Lisburne Lane, Offerton, Stockport, Cheshire. March 11 is G3ZOM Jandek Kits. Further details from **John Verity G4ECI, 7 Adelaide Road, Bramhad, Stockport, Cheshire SK7 1NR. Tel: 061-439 3831.**

**Stourbridge & District ARS** meet 1st & 3rd Mondays, 8pm at Robin Woods Community Centre, Scotts Road, Stourbridge. February 17 is an Annual Constructors' Competition and March 2 is an on air/discussion evening. Details from **Dennis Body G0HTJ at 53 Grove Road, Wollescote, Stourbridge, West Midlands DY9 9AE.**

**Stratford-Upon-Avon & District RS** meet 2nd & 4th Mondays, 7.30pm at the Home Guard Club, Main Road, Tiddington, Stratford-Upon-Avon, Warwickshire. February 24 is 'Cable Television' by Graham Blakeman G6OOX and March 9 is an Open evening. Further details from **Alan Beasley G0CXJ, 2 Ilmington Road, Blackwell, Shipston-on-Stour, Warwickshire CV36 4PE. Tel: (0608) 82495.**

**Stroud & District ARS** meet fortnightly in the Minchinhampton Youth Centre. For more details, please contact **Dave Stallon on (0453) 886964.**

**Sutton & Cheam RS** meet 3rd Thursdays, 7.30pm at Downs Lawn Tennis Club, Holland Avenue, Cheam, Surrey with natter nights on 1st Mondays, in the Downs Bar. February 20 is 'I Followed Rommel' by Joan Nicholls, the 25th is a committee meeting at G3WHK/G0PNT and March 2 is a natter night. More details from **John Puttock G0BWV, 53 Alexandra Avenue, Sutton SM1 2PA.**

**Taunton & District ARC** meet 1st & 3rd Fridays, 7.30pm in 'The Basement', County Hall, The Crescent, Taunton. Other Fridays informally for a natter and station operation, Morse code classes, etc. February 21 is 'Artificial Intelligence' by Garfield Dean G6ABV. For further details, contact **Mr W. Lindsay-Smith G3WNI, Way Close, Madford, Hemyock, Cullompton, Devon EX15 3QY. Tel: (0823) 680778.**

**The GB3HZ Repeater Group** meet at Chiltern Communications, Lincoln Road, Cressex Industrial Estate, High Wycombe, Bucks, 8pm. Details from **Francis Rose G2DRT on (0494) 814240.**

**The Submarine ARC** submerge on Thursdays, 7pm at HMS Dolphin, Gosport, Hants. On February 29 they have their AGM. For more details contact **K. Fisher G0LKX on (0329) 281174.**

**The Three Counties ARC** meet every other Wednesday, 8pm at the Railway Hotel, Liphook Hampshire. March 11 is 'Cellular Telephones And Personal Communications' by Ian Lamb G8KQW. **Kevin Roche G8GOS on (0420) 83091.**

**Thornbury & District ARC** meet at the United Reform Church, Chapel Street, Thornbury, 7.30pm, talks start 8pm. Morse practice sessions are held between 7.30 and 8pm. February is technical topic 'Rig Testing Equipment' by Phil G1USW, the 26th is a VHF/HF activity/natter night, March 4 is a Grand Junk Sale and the 11th is a general meeting/natter/operating night. More details from **H. Cromack G0FSU at Rose Cottage, The Naite, Oldbury-on-Severn, Bristol, Avon BS12 1RU. Tel: Thornbury 411096.**

**Torbay ARS** meet Fridays, 7.30pm at the RAFCC Social Club, Highweek, Newton Abbot. February 14 is a club night and the 21st is their AGM. More details from **Andy Stafford G4VPM on (0803) 32 3055.**

**Trowbridge & District ARC** meet at 8pm, in the Territorial Army Centre, Bythesea Road, Trowbridge, Wiltshire, 8pm. On March 4 they have a visit from RSGB Zone D Representative G3RZP and a talk. More details from **Ian Carter G0GRI on (0380) 830383.**

**Verulam ARC** meet 2nd & 4th Tuesdays, 7.30pm at the RAF Association Headquarters, New Kent Road (off Malborough Road), St. Albans, Hertfordshire. 2nd Tuesdays are their activity evenings and 4th Tuesdays are their main monthly meetings. February 25 is a talk by Mr Western G3SXW entitled 'Pile-ups'. More details from **Walter Craine G3PMF, 5 The Crescent, Abbots Langley, Watford, Hertfordshire WD5 0DR.**

**Wakefield & District RS** meet Tuesdays, 8pm in First Floor Rooms, Ossett Community Centre, Prospect Road, Ossett. February 18 is Rally preparation. **John Bailes G0MVA on (0924) 260048.**

**West of Scotland ARS** meet Fridays, 7.30pm at the Scout HQ, 21 Elmbank Street, Glasgow. For further details, please contact **John Power GM0KTO, PO Box 599, Glasgow G3 6QH.**

**Whitton ARG** meet Fridays, 8pm at the Whitton Community Centre, Percy Road, Whitton, Twickenham. More details from **Rosalind Catley, 15 Park Close, Hounslow, Middlesex. Tel: 081-894 2950.**

**Wiesbaden ARC** - DA1WA - is a club mainly for US military personal stationed anywhere near Wiesbaden, Germany. For more details, contact **Robert Kipp DJ0PU, Hugelstr. 25, D-6070 Langen, Germany.**

**Wigtownshire ARC** have meetings and RAE classes every Thursday, 7.30pm at the Community Education Office, Stranraer Academy. More details from **Ellis Gaston GM0HPK, 3 Victoria Buildings, Cairnryan, Stranraer, Dumfries & Galloway DG9 8RA. Tel: (0581) 2202.**

**Wimbledon & District ARS** meet 2nd & last Fridays in St. Andrews Church Hall, Herbert Road, Wimbledon SW19. February 14 is a general activity evening and the 28th is 'Packet Radio For Beginners' by Peter Burton G3ZPB. **Chris Frost G0KEB, 61 Selbourne Avenue, Tolworth, Surrey KT6 7NR. Tel: 081-397 0427.**

**Wirral ARS** meet 1st & 3rd Wednesdays, 7.45pm at Ivy Farm, Arrowe Park Road, Birkenhead, Wirral. More details from **Alec Seed G3FOO on 051-644 6094.**

**Yeovil ARC** meet Thursdays at Red Cross HQ, Grove Avenue, Yeovil, Somerset. February 13/27th are Construction & Operating nights, the 20th is Getting on the Air on a Shoe String, G3CQR, G3MYM, G1ZNY & G0HDG, March 5 is 'How A Valve Works' by G3MYM and the 12th is a Construction & Operating night. Further details from **Mike Woodford G0JVG, Holm Wood, 5 Orchard Close, South Petherton, Somerset TA13 5DX.**

club News

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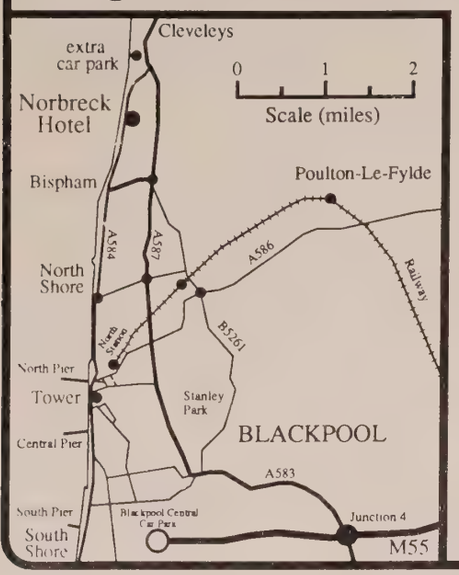


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# Getting Started - The Practical Way



*This month the Rev. George Dobbs G3RJV takes a look at shifting phase, oscillation and sending Morse code before winding up with the completion of the two part Oscamp project.*

We've already built an audio oscillator in this series, in the form of a multivibrator. The value of the multivibrator lies partly in it's signal which is rich in harmonics. This means the output signal can be heard over a wide range, even as high as radio frequencies (r. f.).

As an audio oscillator, the square wave produced by the multivibrator is, to say the least, an unpleasant sound. But don't worry, we're going to build another audio oscillator, and this one will be capable of producing a pleasing audio tone. It will have a variety of applications, and one obvious idea, is using it to produce a tone for a Morse practice oscillator.

### Phase Oscillator

The oscillator this time, will be of a type called a phase shift oscillator. The diagram, **Fig. 1(a)**, shows a representation of a signal, in the form of a single cycle of an a.c. waveform. The shape of the signal is that of a sine wave.

The diagram in **Fig. 1(a)**, is in the form of a graph. The amplitude (amount or strength of the signal) is represented by the height and depth scales, with the diagram 'moving' along in time. Mathematics students will already know them as the X and Y axis.

The signal rises from zero to the maximum positive value, then back through zero, to the maximum negative value and then back to zero. This is called a complete **cycle.**

Again, readers with a little mathematics training will see that the angle of the signal changes in degrees, from 0 to 90° at top, then 180° at the half cycle point, 270° at full negative, and then 360°, completing the 'circle'.

I'm not going to delve into a.c. theory here, but if you're not sure of the techniques, there are many excellent textbooks dealing with the subject.

**Editorial note: The well-known Common Core series of books *Basic Electricity*, and *Basic Electronics*, have particularly good graphics and text explaining a.c. theory. Most libraries still have this series available. The *PW* reprint *Passport To Amateur Radio*, (available from the Book Service) also covers basic theory very adequately and at a very modest price.**

### Two Signals

The diagram in **Fig. 1(b)**, shows what happens if there are two signals of the same frequency, and one lags slightly behind the other in time. We could measure this difference in time, but it is usual to measure it in degrees of angle.

The relationship between the two signals is called the phase. Phase is another word for time, and no doubt you know that we talk about the various 'phases of the moon', when the times for the various 'shapes' (crescent, half and full) are discussed.

Phase, in electrical terms, is measured in degrees, which naturally means that a phase degree is 1/360th of a cycle. In **Fig. 1(b)**, the signal A leads the signal B by 90°. Their phase difference is then said to be 90°.

In **Fig. 1(c)**, the phase difference between A and B is 180°. For those who enjoy mathematics, there are plenty of text books which will explain this further. However, for those of you who hate mathematics, I can only suggest you bear with us, as this simple little excursion into theory will help you understand how our oscillator project works.

### In Phase

We've already found out that if a signal is fed back from the output to the input of a suitable circuit, **in-phase**, it can be made to operate as an oscillator. The diagram, **Fig. 2**, shows a circuit often known as a **phase-shift oscillator**.

The transistor in the circuit is arranged in what is called the common emitter configuration. The emitter goes to the ground end of the circuit.

This arrangement of a transistor gives an output signal that is 180° out-of-phase with the input signal. All we need to do, to make the transistor oscillate, is to add another 180° of phase shift.

### Seemingly Complex

If you look carefully at the seemingly complex arrangement of resistors and capacitors between the collector (output) and the base (input) of the transistor. On closer inspection, you'll see in fact that it's really quite a simple circuit.

The circuit can be considered as two 'T's formed by C1, C2, R1 and R2, R3, C3 either side of ground. This is a filter design known as a twin-T network.

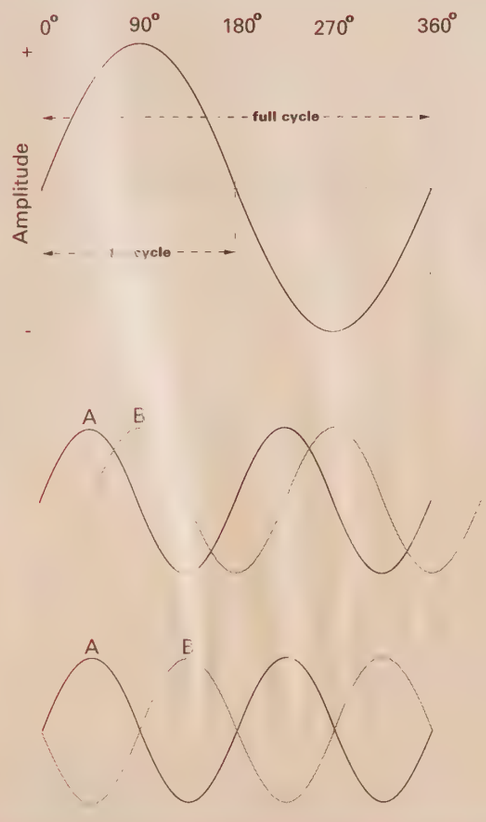


**Fig. 1(a): A representation of a signal, in the form of a single cycle of an a.c. waveform. The shape of the signal is that of a sine wave.**

**(b) This shows what happens if there are two signals at the same frequency, and one lags slightly behind the other in time. The difference could be measured in time, but it is usual to measure it in degrees of angle.**

**(c) The phase difference (see text) between A and B is 180°.**

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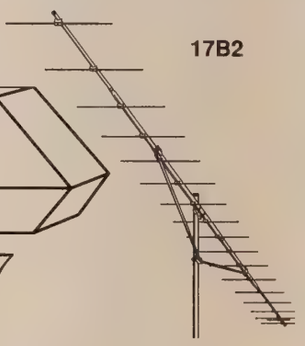

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The circuit's job is to change the phase of the output signal by 180°. This, when added to the phase change produced by the transistor, provides a 360° phase-shift between the output and the input.

The output signal is changed by the 'extra' 180° to allow it to go back into the input with a phase change of 360° (one full cycle). This action places the output signal back in-phase with the input signal, thus causing the circuit to oscillate.

### Frequency Of Oscillation

Because the in-phase oscillation only occurs at one frequency, the frequency of the oscillation is controlled by the values of the twin-T network. The values here provide a pleasant sound just below 1kHz.

With careful choice of R4 for an individual transistor, a very good sine wave signal can be produced. The value of 10kΩ is a compromise, which appears to suit most examples of the BC183 transistor.

The output is taken from the centre of half of the twin-T network by the capacitor C4. A variable resistor, R5, allows you to choose a suitable output level.

### Good Workhorse

I'll put a word in on behalf of the BC183 transistor. It's a good 'workhorse' and reasonably priced device. However, take heed, and don't directly substitute the BC183L transistor which may seem to be suitable, whereas in reality isn't!

This is because although electrically identical, the BC183L version has a different lead-out arrangement. Because of this, the two transistors are not interchangeable without altering the placement of the leads in the circuit layout. The BC183A, B or C are all fine for this circuit, but please remember to avoid the BC183L version.

### The Layout

The layout for the oscillator circuit using 'perfboard' is shown in **Fig. 3**. The layout was derived by using the 0.1in graph paper and pencil method outlined in the last part of this series.

The layout has been arranged with plenty of space for ease of construction. Pads have been included to allow leads to go to a front panel-mounted level control, R5.

The diagram, **Fig. 4**, shows the layout for a p.c.b. The diagram illustrates the copper track side.

### Simple To Build

The circuit is very simple to build. With the exception of the transistor, there are no polarised components to worry about which is the correct way round on the board.

Even the capacitor types are not critical. I used the cheaply available disc ceramic types. The level control, R5, is a linear track carbon composition potentiometer.

After building the board, and checking the component placement and soldering, it may be bench tested. This is done by applying the output to a pair of headphones, or even a small loudspeaker.

Testing in this way will not provide a very good match to the circuit, but it will produce an audio output to show that the board works.

A 9V PP3 size battery will provide a suitable supply for the oscillator board. A simple on-off switch, can be added. The output goes to a suitable socket, and I used the common and inexpensive 'phono' socket for this purpose.

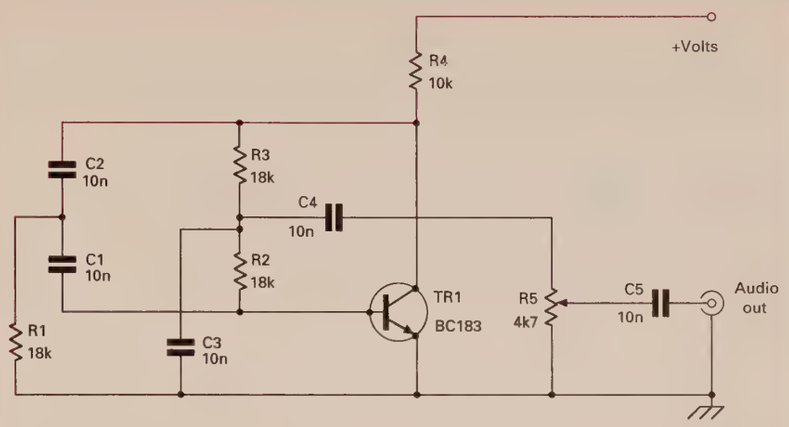


**Fig. 2: The circuit used in this month's project, which often called a 'phase-shift oscillator'.**

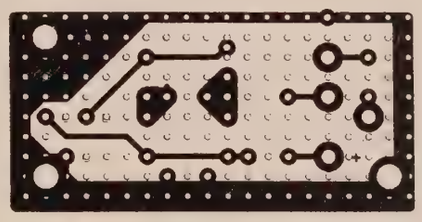

**Fig. 3: The project laid out for construction using 'perf' board, showing relative positions of matrix holes (see text).**

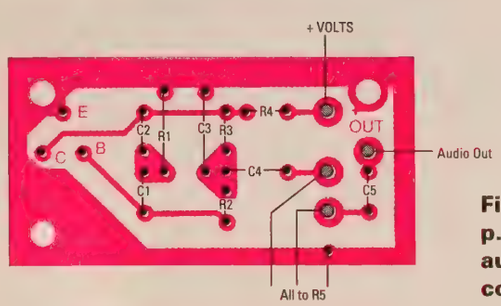


**Fig. 4: The suggested p.c.b. design for the audio oscillator with component overlay.**

### Ideal Companion

The oscillator makes an ideal companion for the audio amplifier built in the last month's 'Getting Started'. Together, they can provide a useful piece of test bench equipment, which will produce an audio signal, and amplify an audio signal.

The two units can be used together to make a pleasant tone generator, which can be used for Morse code practice. As you've probably noticed, many Morse practice oscillators produce an unpleasant rasping tone. This one doesn't, and it can be used for hours without listener stress!

### Aluminium Box

I built the Oscar 50 project into a Minffordd aluminium box, type A25 76 x 140 x 38mm. The method is a little odd, in that the top of the box is used as the front panel, and both boards are mounted along one side of this section.

The front panel is very simple. Both the oscillator and the audio amplifier have three front panel mounted components. Each has an on-off switch, wired to the same PP3 battery.

Each unit has a potentiometer control. There's a volume control for the audio amplifier and a level

control for the oscillator.

Both units have a phono socket. One is for the the output of the oscillator and the input of the audio amplifier. A small, (50mm diameter) loudspeaker for the audio amplifier completes the front panel.

### Using The Oscamp

The completed Oscamp can be used as either an audio signal source, or a test bench audio amplifier. These are both useful in their own ways.

By connecting the oscillator to the amplifier, an audio tone is produced in the loudspeaker. As I've already suggested, it then makes a fine Morse practice oscillator.

To use the Oscamp as the Morse code practice unit, all we have to do is connect the output of the oscillator to the input of the audio amplifier. The phono sockets are designed for screened leads.

To 'key' the unit as the Morse oscillator, we only need to join, and interrupt, the centre connections on the phono sockets. The ground return lead is then made through the box.

### Switches On

Obviously, both switches must be on to power the boards. The oscillator level control and the amplifier volume control will both vary the output from the loudspeaker. Which do we use? The answer is both of them!

If the oscillator overloads the amplifier, the tone will be less pleasant. However, if the amplifier is turned up too much, the internal noise of the amplifier will produce a hiss over the tone.

Like many things, the answer is compromise. A little bit of oscillator, and a little bit of amplifier and you'll soon get the hang of it.

Anything else to bear in mind? Well, the answer is yes. Use a good Morse key, practice a little everyday, get the **receiving** right before you begin to send, etc., and you'll do well. Have fun using your Oscamp, and I'll see you next time. **PW**

### Shopping List

**Resistors 0.25W Carbon Film**

| | | |
|---|---|---|
| 4.7kΩ | 1 | R1 |
| 18kΩ | 1 | R2 |
| 18kΩ | 1 | R3 |
| 10kΩ | 1 | R4 |

**Variable resistor (linear)**

| | | |
|---|---|---|
| 4.7kΩ | R5 | |

**Capacitors**

Disc ceramic

| | | |
|---|---|---|
| 10nF | 5 | C1, 2, 3, 4, 5. |

**Semiconductor**

| | | |
|---|---|---|
| BC183 | 1 | See Text |

**Miscellaneous**

Single-pole on-off miniature toggle switch, PP3 type battery connector, (suggested) Minffordd aluminium box type A25.

Sources: All the parts are common and may be obtained from most component traders.

The BC183 (and other parts) available from Marco Trading, The Maltings, High Street, Wem, Shropshire SY4 5EN. Tel: (0939) 32763.

Suitable case from Minffordd Engineering, Sun Street, Ffestiniog, Gwynedd, Wales LL41 4NE. Tel: (0766) 762572.

# Can You Help?

**Ken Llewellyn of 1 Heol Nant Castan, Rhiwbeina, Cardiff, Wales CF4 6RP**, needs some help in repairing a 'global clock' by Union Electronics. It is a silver globe with tiny lights, which indicate cities, and below the local time is showing.

He cannot recall where he has seen this clock advertised, but has certainly seen it in more than one magazine. Now, a fault has developed and his local clock repairers are unable to repair it. He would like to know the address of the UK agent or service people, and would be very grateful if anyone can help.

**Mr Gordon-Harris, 31A Sea Road, Bexhill-on-Sea, East Sussex TN40 1EE**, needs some help in trying to locate a component to replace one which is damaged in his 'Nova Pal' radio and direction finder.

It has been suggested that he use a potentiometer (the damaged component) with a 2-way switch and incorporate a second 2-way switch mounted separately. This can be done, but he would much prefer to find a replacement for the existing component which incorporates the two 2-way switches, but this is difficult to find. Can anyone help?

**Harold Orriss, 7 Parkwood Avenue, Wivenhoe, Colchester CO7 9AN**, is looking for a valve manual that went with the Taylor valve tester, series 45. He will gladly refund any costs incurred.

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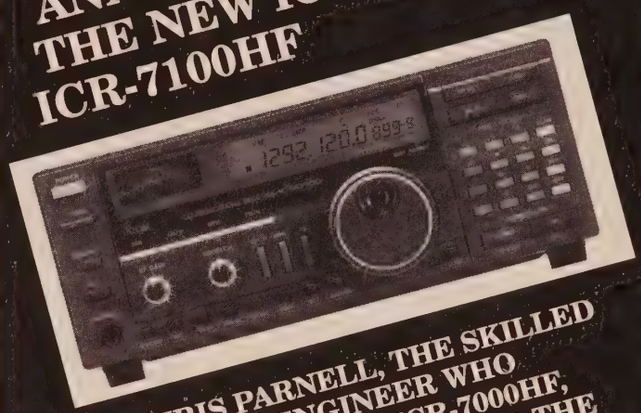

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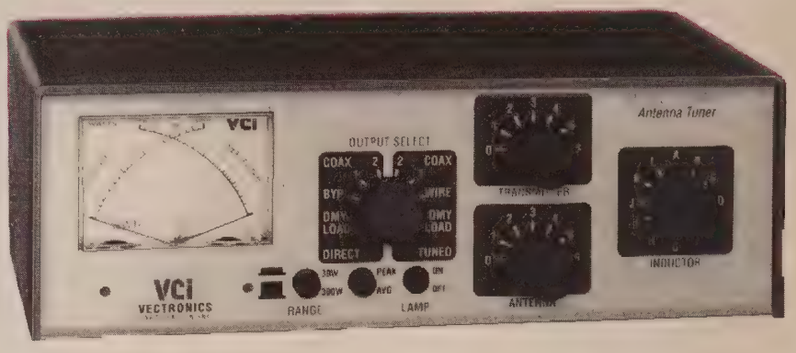
# The Vectronics VC300-DL Antenna Tuner

***Ron Stone GW3YDX, had heard about the Vectronics antenna tuner and was very interested in reviewing it. So, we thought it would be a good idea for Ron to take a look at this Canadian product, and share his thoughts with readers.***




Review

The Vectronics VC300-DL antenna tuner is imported into the UK by ICS Electronics. The tuner was previously marketed by AEA as the QT-1, but is now imported directly from the manufacturers as the VC300-DL. Having previously reviewed the MM-3 'Morse Machine', in *PW* a while ago, I was very keen to have a look at another product available from ICS.

The tuner duly arrived. It was well packed in a stout cardboard box, and came complete with a 10-page owner's manual.

I have had quite a few antenna tuning units pass through my hands over the years, so I have had a lot of practice in using them. However, for the purpose of this review, I would aim at 'pretending' I was a complete novice in the art of using antenna tuners. In this way, the value of the user-manual could be properly tested.

## Variety Of Antennas

I had a variety of antennas available for the tests. They ranged from 144MHz verticals, to h.f. beams and verticals.

In addition to the usual antennas, I also erected a G5RV and a 40m 'long wire', to see just how well the VC300-DL would match my various rigs to these old 'favourites'.

The unit was reasonably sized, measuring 89 x 264 x 239mm. The physical construction of the VC300-DL has been well thought out, with all the controls clearly labelled, and easy to use.

The internal impedance matching circuit consists of a T-match network. This is used in conjunction with a tapped inductor, and series variable capacitors on the transmitter and antenna sides of the inductor. There is also a dummy load facility, and the makers provide indication of both r.m.s. and p.e.p. on the metering.

## Dual Meter

The meter, can be illuminated by supplying 12V a.c. or d.c. to a connector at the rear. It's of the dual type, and the double-movement instrument displays forward and reflected power.

The meter is switchable to 300W forward, 60W reflected or 30W forward and 6W reflected simultaneously and an additional v.s.w.r. scale. The v.s.w.r. is indicated where the two needle pointers cross on the meter scale.

An output selector switch is built-in, and metering is provided irrespective of its setting. The selectable options are as follows:

**1:** Selects 'straight through' to one rear panel-mounted SO239 connector. This output would be used with antennas that require no matching.

**2:** Selects 'straight through' to additional SO239 connectors, marked 'Coax 1' and 'Coax 2', or to connector 'Coax 1' and 'Coax 2', via the internal impedance matching circuitry. This would be useful, if for instance, a dipole that has been cut for one end of 3.5MHz, and the occasional use of the other end of the band was required.

In this case, the use of the matching circuitry would probably be required, to ensure a reasonable match to the p.a. stage of the transmitter.

**3:** Selects and connects the matching network to a single wire antenna or one fed via a balanced feeder, such as a G5RV. A 20m long wire could be a reasonable direct match to 50Ω on 3.5MHz, but if it was used as a half-wave on 7MHz, a high impedance would be presented to the transmitter, and a matching network would be required.

**4:** Connecting into a dummy load. There's a rather nice little trick they've used here, in that the dummy load option can be selected at either end of the rotating switch limits. This saves time, and a lot of unnecessary switch contact wear.

The rear panel connections are SO239 type connectors to the transmitter output and coaxial antenna feedlines. Banana-type jack plugs (screw or plug-in) are provided for wire terminations. Additionally, there are connectors for the 12V d.c. for the lamp illumination, and also an earth (ground) post.

Interestingly enough, I found that the instructions didn't give any guidance on the use of the earthing post. This is surprising, as when an end fed wire antenna is used, radio frequency interference (r.f.i.), can often be reduced and tuning eased, by the connection of a counterpoise λ4 wire to an earth-post.

## Operation Quite Easy

Operation of the tuner was quite easy, although I found I needed a steady hand on 28MHz. This was because the tuner controls weren't equipped with slow-motion drives.

I found that the user manual was clearly written, and the suggested setting of the controls was a

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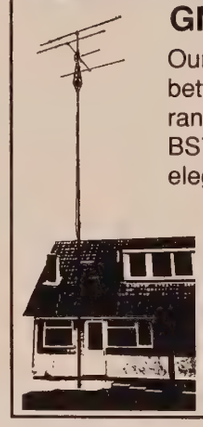

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| 3.6MHz | 100W | 90W |
| 7.1MHz | 100W | 93W |
| 14.2MHz | 100W | 93W |
| 21.3MHz | 100W | 92W |
| 28.8MHz | 100W | 86W |

**Table 1. Comparison table showing both the measured power output with the a.t.u. by-passed in 'straight through' mode, and in use to match the load, with the resulting insertion losses.**

useful guide when I tuned an antenna for the first time. This information would be particularly useful to anyone unfamiliar with antenna tuning units.

I tested the tuner into nearly all the antennas at my QTH. Using a transmitter on 1.8MHz, the a.t.u. matched a 10m length of coaxial feeder with a 70MHz dipole on the other end, to 1:1 v.s.w.r. quite adequately, and coped with the maximum legal output on the band without any strain!

After that little excursion, the more usual types of antennas were tested, and the transmitter matched into the load. With patience, I found that all the antennas could be tuned to a 1:1 v.s.w.r., as indicated on the VC300-DL, and on the internal meters on the rig. The user guide had space so that the settings, once they had been found, could be recorded for future use.

## Power Losses

The next test I carried out, was to see how much power was lost in the matching circuit. To carry out this test, I connected an external power meter in the line between the VC300-DL and a 50Ω dummy load.

I measured 100W into the load using the 'straight through' position for 'Coax 1' and the output then run via a matching network, tuned for an indicated 1:1 v.s.w.r. on the a.t.u.'s meter. The results I obtained are shown in **Table 1.**

Metering of both the r.m.s. and p.e.p. levels was accurate to 7%, using a calibrated external reference (but see my comments on p.e.p. readings later).

Although the measured losses in **Table 1.** may appear to be significant, at worst they are actually only fractions of a dB, and are unlikely to be noticed when you're on the air. However, if the transmitter is working into a poor match for a transistorised p.a. (particularly), protection circuitry is likely to limit the r.f. power output.

## Older Equipment

Some older equipment, fitted with a transistorised p.a., will automatically protect and limit output to 30W or so, from around 100W in the presence of a 3:1 s.w.r. A power reduction of that level, is around 4dB. That's the best part of a S-unit, and it probably **would** be noticed on the air. So you'll probably realise the benefit of having a tuner, if the load is likely to be a significantly mis-match to the p.a. output impedance.

Even quite good broadband antennas, such as my TH7DX, which is rated for 'below 2:1 v.s.w.r. over the entire 28MHz band', cause my TS930 to limit its output to 65W on 29.7MHz. But, with the VC300DL in circuit, my TS930 quite happily delivers 100W into the a.t.u., and more r.f. is radiated, despite the small loss in the tuner's matching network.

The VC300-DL is rated at 300W maximum through power. In order to test this, I used my Drake 7 amplifier to generate 400W p.e.p., which was then passed on through the a.t.u.'s circuitry into a G5RV antenna, working on all bands from 3.5 to 28MHz. There were no problems at all, and I was satisfied that the a.t.u. would match the full legal UK output power into sensible loads.

## Constructional Comment

On the constructional side, perhaps one or two comments won't be out of place. For example, I noticed that the SO239 antenna connectors and the internal earthing connections to the case, used rivets rather than nuts and bolts.

Although the rivets provided a secure enough fixing on the new tuner I reviewed, rivets have a habit of eventually working loose, and they would need a periodic check to stop any problems.

When the unit was in use, I found that the p.e.p. metering didn't have a peak-hold facility. As a result, normal speech would give an indicated 50W or so for a true 100W p.e.p., as measured on an oscilloscope, and this could be misleading. Only a prolonged 'WAAALLO', spoken into the microphone on my rig provided a 100W p.e.p. indication on the meter.

Although the a.t.u. is generally well-built, the meter is only held in place by one internal bracket on the rear of the assembly. Moving coil meters are delicate instruments, and a firmer method of fixing would be better.

In fact, the meter had been shaken up in transit from the USA, as during the test period, there were several occasions when the meter needles got stuck, at the point where they intersect, due to inadequate clearance between the two pointers.

I found this rather annoying, and the only way to clear the fault was to rap a fingernail against the meter face. This isn't good practice, so I had to dismantle the meter and gently bend the needles until clearance was adequate. This operation demands a steady hand, and some knowledge of meter movements to avoid further damage. It also probably invalidates the guarantee!

## Conclusions

The VC300-DL is a useful device, especially if you are using antennas that are mismatched to your transmitter output. It provides an extra safeguard, particularly if you are using equipment with a solid state p.a.

The tuner switching arrangements and the internal dummy load is especially flexible. The VC300-DL is also 'user-friendly', as is the well-written and useful owner's manual.

Power handling capabilities are unlikely to be a problem whatever transceiver is used, neither is the final antenna load likely to be a problem. The a.t.u. also appears to be capable of handling 400W p.e.p. output into reasonable loads, despite its 300W rating.

Only minor problems were noted with the review unit, and I would buy one myself. There is also a cheaper version available. This model, the VC300 tuner, has no dummy load or meter illumination fitted.

**My thanks for the loan of the review model, go to ICS Electronics Ltd., Unit V, Rudford Industrial Estate, Ford, Arundel, West Sussex BN18 0BD, tel: (0903) 731101, who can supply the Vectronics VC300-DL for £159.95 including VAT plus £6 post and packing.**

# Antenna System Losses

## Part 1

Theory

*Fred Judd G2BCX, like everyone else, has had to deal with the problems associated with matching antennas, and overcoming s.w.r. difficulties. However, with an experienced guide like G2BCX passing on his experience, a complex subject is made easier to understand for those of us who are interested, but daunted by the theory.*

The notes and charts that follow, apply to any antenna using a 50Ω coaxial cable transmission line but no antenna tuning unit.

An **ideal antenna** system is one whereby the transmission line has **no loss**. In other words, the antenna offers no attenuation, and the antenna **input impedance** exactly **matches** that of the **transmission line** and which, in turn, **matches** the **output impedance** of the **transmitter**. See **chart 1, Fig. 1**. *

The reflection coefficient will therefore be zero, and the standing wave ratio (s.w.r.) measured at the transmitter output to transmission line will be **unity**. (ratio 1:1). * **All the power from the transmitter will then reach the antenna.** *

### Impedance Mismatch

If an **impedance mismatch** exists between the **transmission line** and the **antenna**, then some of the r.f. energy reaching the antenna will be **reflected**. * See chart 2, **Fig. 2**.

The reflection coefficient will assume a 'finite' value, which means that the load resistance (R) (the antenna) will be greater or less than the transmission line impedance (Zo). In this case, the s.w.r. **increases**, so the 'measured ratio' (at the transmitter) will be **higher** than 1:1. **ALL** r.f. power, reflected from the antenna, then re-enters the transmitter and is absorbed. This reflected power is lost to the antenna. *

### Attenuation Factor

**All** transmission lines, and especially coaxial cable, have a nominal attenuation factor proportional to the frequency of operation. Any r.f. power from the transmitter (and reflected power) is therefore attenuated.

This attenuation factor will be N dBs, according to the **total length of line in use, and the frequency at which the system is being operated. The r.f. power thus attenuated, is also lost to the antenna.**

Remember that: Power dissipated by resistive and other losses due to the antenna itself is **not** radiated.

### Performance Evaluation

The data charts are simple to use, and will provide the foregoing and other information, without you having to resort to complex mathematics. **But do remember that**: The information provided by the data charts assumes that **no a.t.u. is employed**.

* **To make full use of the data charts, the following information is required.**

* (a) The total attenuation in dBs **for the full length of coaxial cable** (transmission line) in use **at the frequency of operation**.

* (b) The s.w.r. as measured **at the transmitter output**. If a linear amplifier is used, it is assumed that the s.w.r. meter is connected between its output and the transmission line.

* (c) The r.f. power output **from the transmitter and/or the linear amplifier (if used)**.

* (d) Antenna gain (if any) in dBd (dBd means dB gain referenced to a dipole).

### Obtaining Performance Factors

Using the information I've already provided, in conjunction with the data charts, the following **antenna performance factors** can be obtained:-

* Percentage of power supplied by the transmitter available at the antenna for radiation, when the s.w.r. is greater than unity (1:1) and the total transmission line (coaxial cable) attenuation is greater than 0dB.

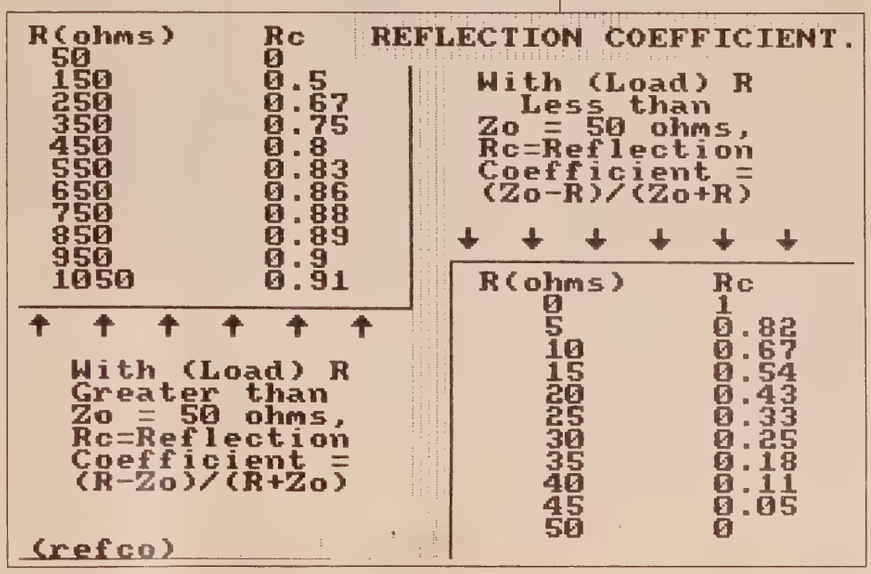
* The s.w.r. at the antenna itself (for the above conditions).

* The effective radiated power from antennas having N dB gain over a dipole (less the power lost by s.w.r. and cable attenuation).

* Conversion: Percentage power to power in watts.

* Conversion: dB watts to actual power watts, or vice versa.

* Reflection coefficient (Chart 1).



REFLECTION COEFFICIENT.

| R(ohms) | Rc |
|---|---|
| 50 | 0 |
| 150 | 0.5 |
| 250 | 0.67 |
| 350 | 0.75 |
| 450 | 0.8 |
| 550 | 0.83 |
| 650 | 0.86 |
| 750 | 0.88 |
| 850 | 0.89 |
| 950 | 0.9 |
| 1050 | 0.91 |

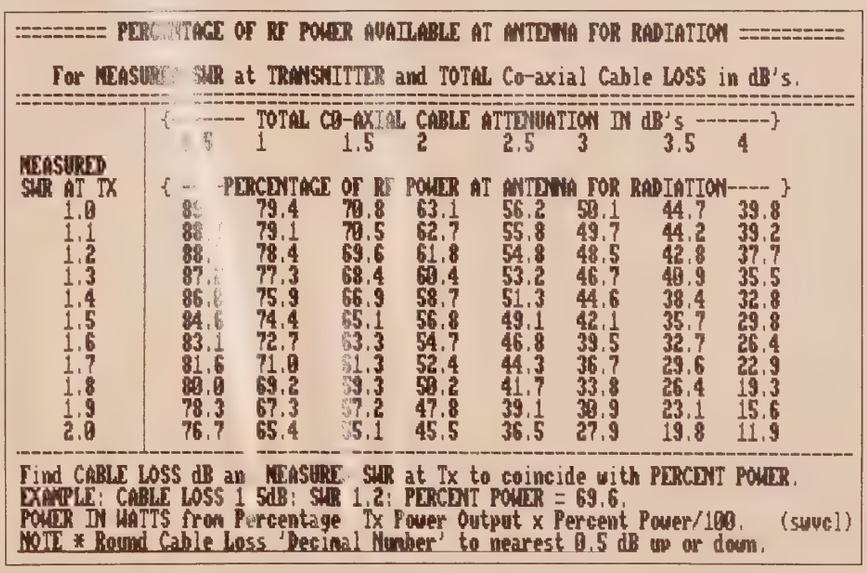
With (Load) R Greater than Zo = 50 ohms, Rc=Reflection Coefficient = (R-Zo)/(R+Zo)

With (Load) R Less than Zo = 50 ohms, Rc=Reflection Coefficient = (Zo-R)/(Zo+R)

| R(ohms) | Rc |
|---|---|
| 0 | 1 |
| 5 | 0.82 |
| 10 | 0.67 |
| 15 | 0.54 |
| 20 | 0.43 |
| 25 | 0.33 |
| 30 | 0.25 |
| 35 | 0.18 |
| 40 | 0.11 |
| 45 | 0.05 |
| 50 | 0 |

(refco)

**Fig. 1:**
**Chart 1 (see text).**



PERCENTAGE OF RF POWER AVAILABLE AT ANTENNA FOR RADIATION

For MEASURED SWR at TRANSMITTER and TOTAL Co-axial Cable LOSS in dB's.

| MEASURED SWR AT TX | TOTAL CO-AXIAL CABLE ATTENUATION IN dB's: .5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
|---|---|---|---|---|---|---|---|---|
| | PERCENTAGE OF RF POWER AT ANTENNA FOR RADIATION | | | | | | | |
| 1.0 | 89 | 79.4 | 70.8 | 63.1 | 56.2 | 50.1 | 44.7 | 39.8 |
| 1.1 | 88 | 79.1 | 70.5 | 62.7 | 55.8 | 49.7 | 44.2 | 39.2 |
| 1.2 | 88 | 78.4 | 69.6 | 61.8 | 54.8 | 48.5 | 42.8 | 37.7 |
| 1.3 | 87 | 77.3 | 68.4 | 60.4 | 53.2 | 46.7 | 40.9 | 35.5 |
| 1.4 | 86 | 75.9 | 66.9 | 58.7 | 51.3 | 44.6 | 38.4 | 32.8 |
| 1.5 | 84 | 74.4 | 65.1 | 56.8 | 49.1 | 42.1 | 35.7 | 29.8 |
| 1.6 | 83.1 | 72.7 | 63.3 | 54.7 | 46.8 | 39.5 | 32.7 | 26.4 |
| 1.7 | 81.6 | 71.0 | 61.3 | 52.4 | 44.3 | 36.7 | 29.6 | 22.9 |
| 1.8 | 80.0 | 69.2 | 59.3 | 50.2 | 41.7 | 33.8 | 26.4 | 19.3 |
| 1.9 | 78.3 | 67.3 | 57.2 | 47.8 | 39.1 | 30.9 | 23.1 | 15.6 |
| 2.0 | 76.7 | 65.4 | 55.1 | 45.5 | 36.5 | 27.9 | 19.8 | 11.9 |

Find CABLE LOSS dB an MEASURED SWR at Tx to coincide with PERCENT POWER.
EXAMPLE: CABLE LOSS 1 5dB: SWR 1.2: PERCENT POWER = 69.6.
POWER IN WATTS from Percentage Tx Power Output x Percent Power/100. (suvcl)
NOTE * Round Cable Loss 'Decimal Number' to nearest 0.5 dB up or down.

**Fig. 2:**
**Chart 2 showing r.f. power percentages available at antenna (see text).**

SOME CO-AXIAL CABLES AND ATTENUATION FOR DIFFERENT LENGTHS AT 145MHz *

(M)UR67: 2.54dB per 30 metres/100 feet

For 10 metres/32.8 feet - 0.84 dB.
15 metres/49.2 feet - 1.26 dB
20 metres/65.6 feet - 1.68 dB.

(M)UR43: 4.8dB per 30 metres/100 feet

For 10 metres/32.8 feet - 1.6 dB.
15 metres/49.2 feet - 2.4 dB.
20 metres/65.6 feet - 3.2 dB.

(M)UR76: 6.5 dB per 30 metres/100 feet

For 10 metres/32.8 feet - 2.1 dB.
15 metres/49.2 feet - 3.15 dB.
20 metres/65.6 feet - 4.2 dB.

* Co-axial Cable Data for other Frequencies: From Manufacturers.

(cxat)

**Fig. 3:**
**Chart 3. Cable attenuation (see text).**

ANTENNA GAIN dBd to ANTENNA POWER GAIN.

| Antenna Gain dBd | Power Gain | Antenna Gain dBd | Power Gain | |
|---|---|---|---|---|
| 1 | 1.3 | 9 | 7.9 | |
| 1.5 | 1.4 | 9.5 | 8.9 | |
| 2 | 1.6 | 10 | 10 | |
| 2.5 | 1.8 | 10.5 | 11.2 | |
| 3 | 2 | 11 | 12.6 | P |
| 3.5 | 2.2 | 11.5 | 14.1 | G |
| 4 | 2.5 | 12 | 15.8 | D |
| 4.5 | 2.8 | 12.5 | 17.8 | B |
| 5 | 3.2 | 13 | 20 | |
| 5.5 | 3.5 | 13.5 | 22.4 | |
| 6 | 4 | 14 | 25.1 | |
| 6.5 | 4.5 | 14.5 | 28.2 | |
| 7 | 5 | 15 | 31.6 | |
| 7.5 | 5.6 | 15.5 | 35.5 | |
| 8 | 6.3 | 16 | 39.8 | |

From Chart.2 find PERCENT POWER at Antenna. Convert to Watts. Multiply by POWER GAIN to obtain TOTAL ERP.

**Fig. 4:**
**Chart 4 (see text).**

RF POWER in dB WATTS to POWER WATTS *

| Power dB Watts | Power WATTS === | Power DB Watts | Power WATTS === |
|---|---|---|---|
| 11 | 13 | 26 | 398 |
| 12 | 16 | 27 | 501 |
| 13 | 20 | 28 | 631 |
| 14 | 25 | 29 | 794 |
| 15 | 32 | 30 | 1000 |
| 16 | 40 | 31 | 1259 |
| 17 | 50 | 32 | 1585 |
| 18 | 63 | 33 | 1995 |
| 19 | 79 | 34 | 2512 |
| 20 | 100 | 35 | 3162 |
| 21 | 126 | 36 | 3981 |
| 22 | 158 | 37 | 5012 |
| 23 | 200 | 38 | 6310 |
| 24 | 251 | 39 | 7943 |
| 25 | 316 | 40 | 10000 |

* NOTE:10dB Watts = 10 Watts (Power).

dbwx

**Fig. 5:**
**Chart 5 (see text).**

## Using The Charts

The charts are used as follows:

*** Chart 1: As described in introduction.**

*** Chart 2: Percentage of r.f. power available at the antenna for radiation**. First step - find the s.w.r. as measured at transmitter or linear amplifier output. Then find the **total** coaxial cable loss in dB. From these, you will be able to find the percentage of power from the transmitter available at the antenna. (Example on chart).* Power in watts from percentage = transmitter x % power/100.

*** Chart 3: Examples of total loss (dB) for commonly used coaxial cables and lengths**. Total length may be to nearest 0.5m. **Note:** The cable attenuation from approximately 20MHz **down**, may be taken as 0.5dB for a **total** length not more than approximately 12. (M)UR76 is included to show high loss at v.h.f. Data: Other cables and frequencies from manufacturers.

*** Chart 4: Total power radiated from an antenna with directional gain**. This could be any form of beam antenna, or collinear system and taking s.w.r. and coaxial cable loss into account, but assuming **no loss** due to the antenna itself. From Chart 2, determine the total power (in watts) at the antenna.

From Chart 4, find the antenna gain (dBd) and then the power gain (opposite column). Multiply power at antenna in watts by the power gain. For example: The s.w.r. is 1.2:1. The cable loss is 1dB. Percentage of the power at the antenna is 78.4%. Transmitter power output is 15W and power at the antenna is 11.76W. Antenna gain is 6dBd. Power gain is 4. Power radiated (assuming **no antenna loss**) = 11.76 x 4 = 47.04W and this is also known as **effective radiated power** (e.r.p.).

* **Chart 5: Power at antenna in dBW**. The amateur radio transmitting licence schedule issued by the Department of Trade and Industry, gives the r.f. power allowed for the various amateur bands in "dB Watts". Some operators may find this confusing, particularly when they are trying to determine the r.f. power available at the antenna as effective power to be radiated (e.r.p.) in actual watts or, for certain bands, in dBW.

Chart 5 gives dBW from 10 to 40 and related power in watts. This chart will convert:

**(a)** Transmitter power output in actual watts to dBW, or vice versa.

**(b)** Effective radiated power (e.r.p.) in actual watts, or in dBW, from an antenna with a gain greater than unity, in other words, greater than 0dBd.

Worked examples:

**1**: Transmitter r.f. power output = 100 which = 20 dBW.

**2**: The above r.f. power (100W) reaching the antenna after losses due to s.w.r. and cable attenuation, has been verified as say 79% or 79 actual watts (19dBW). The antenna has a directional gain of 12dBd, which is a **power gain** of 15.85 (round-up to 16). We assume there is no antenna loss, in which case, the e.r.p. = 79 x 16 = 1264W (1.264kW) or approx: 31dBW.

**3**: Frequency of operation 145MHz. The total r.f. power from the transmitter plus linear amplifier = 60W. The s.w.r. = 1.1, cable loss = 1dB. The power at the antenna = 79.1% or 47.46W (round up to 47.5W). Beam antenna directional gain is 16dBd, so the power gain is 39.81 (round up to 40). We assume **no antenna loss**, in which case the e.r.p. = 47.5 x 40 = 1900W (1.9kW) or approx: 33dBW.

**Chart 6:** This shows that the s.w.r. measured at the transmitter is always **lower** than the s.w.r. at the

antenna, when a mismatch exists between the transmission line and the antenna. This is because the reflected power from the antenna is attenuated by the transmission line, before it reaches the transmitter.

In other words the true s.w.r. would be **that measured at the antenna** (example provided on the chart).

The chart indicates that high s.w.r. at the transmitter and high transmission line loss, could mean a **very high s.w.r.** at the antenna. **Note**: With **no cable loss** the s.w.r. measured at the transmitter and the antenna would be the same.

*For some h.f. and v.h.f. antennas an a.t.u. is employed. To help in this situation, I'm preparing additional data charts for this combination, and these will appear in Part 2.*

======SWR AT THE ANTENNA FOR DIFFERENT VALUES OF SWR AT THE TRANSMITTER ======
AND 'TOTAL' TRANSMISSION LINE (CO-AXIAL CABLE) LOSS IN dBs.

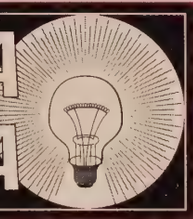
| | {-------- TOTAL CO-AXIAL CABLE ATTENUATION IN dB's --------} | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 |
| MEASURED SWR AT TX | {----------SWR AT ANTENNA FOR GIVEN SWR AT TX -------} | | | | | | | |
| 1.00 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 1.05 | 1.1 | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 |
| 1.10 | 1.2 | 1.3 | 1.3 | 1.3 | 1.4 | 1.4 | 1.5 | 1.6 |
| 1.15 | 1.3 | 1.4 | 1.5 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 |
| 1.20 | 1.5 | 1.5 | 1.6 | 1.7 | 1.8 | 2.0 | 2.2 | 2.4 |
| 1.25 | 1.6 | 1.7 | 1.8 | 1.9 | 2.1 | 2.3 | 2.6 | 3.0 |
| 1.30 | 1.7 | 1.8 | 2.0 | 2.2 | 2.4 | 2.7 | 3.1 | 3.8 |
| 1.35 | 1.8 | 2.0 | 2.2 | 2.4 | 2.7 | 3.1 | 3.8 | 4.7 |
| 1.40 | 1.9 | 2.1 | 2.4 | 2.7 | 3.1 | 3.7 | 4.5 | 6.1 |
| 1.45 | 2.1 | 2.3 | 2.6 | 2.9 | 3.5 | 4.3 | 5.6 | 8.1 |
| 1.50 | 2.2 | 2.4 | 2.8 | 3.2 | 3.9 | 5.0 | 6.9 | 11.3 |
| 1.55 | 2.3 | 2.6 | 3.0 | 3.6 | 4.4 | 5.8 | 8.7 | 17.4 |
| 1.60 | 2.5 | 2.8 | 3.3 | 3.9 | 5.0 | 6.9 | 11.5 | 33.5 |
| 1.65 | 2.6 | 3.0 | 3.5 | 4.3 | 5.7 | 8.3 | 15.9 | |
| 1.70 | 2.7 | 3.2 | 3.8 | 4.8 | 6.5 | 10.2 | 24.6 | |

SWRA

EXAMPLE: SWR MEASURED AT TX - 1.25: CABLE LOSS - 1.5dB: SWR AT ANTENNA - 1.8_

**Fig. 6: Chart 6 (see text).**

# WHAT A GOOD IDEA



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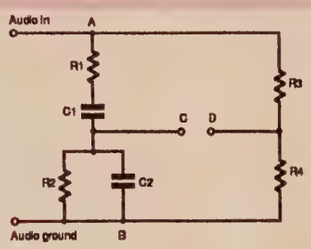
## Whistle-Killer

How many times have you found an interesting signal, buried in the midst of an annoying whistle? If only the whistle could be made inaudible without affecting the signal itself this would make listening so much more pleasurable. This was a problem I set about trying to solve.

I based my experiments on the Wien Bridge shown in **Fig. 1**. To understand how it works, assume we make resistor R1 the same value as R2, and capacitor C1 the same value as C2. At one frequency, the signal at point C (referenced to ground) will be in-phase with the input signal (referenced to ground), but with only 1/3 of the input signal level (also referenced to ground). At all other frequencies the phase and output level change. As this output signal is in-phase with the input signal, the network appears as if it were resistive, (**but only at this frequency**). If we were to arrange a resistive divider (R3/R4) to have the same ratio, then with reference to point D, point C would have no signal difference (**but only at this frequency**). So, to get rid of the whistle we change the circuit values to match the whistle frequency, and take a signal out between points C and D. This means keeping point D at signal ground.

**Fig. 1.**




## Major Disadvantage

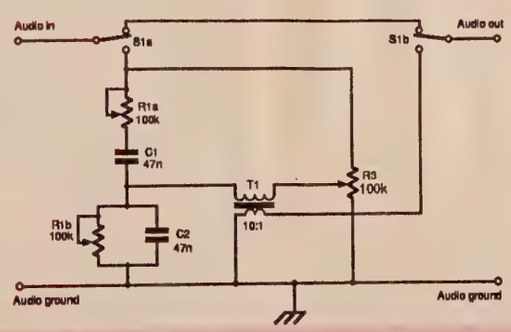
This circuit has one major disadvantage. That is, that we already have a signal ground (point B). Putting in another signal ground would short out R4 and render the circuit useless. How can we overcome this problem?

## Difference Only

The circuit of **Fig. 2** is one answer that is simple to make and it works. We only want the **difference** between the signals, and so I used an old audio transformer to isolate the points from ground, but still allow the signal difference to be extracted. The transformer is one I found in an old radio, with about a 10:1 ratio. This reduces the loading on the output terminals, reducing the whistle to a minimum without much change to the other frequencies.

I fitted the switch S1 to allow the circuit to be by-passed when wanted. I also changed the resistors R1 and R2 (of **Fig. 1**) to a dual gang 10 kΩ variable type (R1/2 of **Fig. 2**). This change allows the filter frequency to be altered for best effect. Combining R3 and R4 (of **Fig. 1**) into variable resistor R3 (of **Fig. 2**) allows the rejection depth to be altered

**Fig. 2.**

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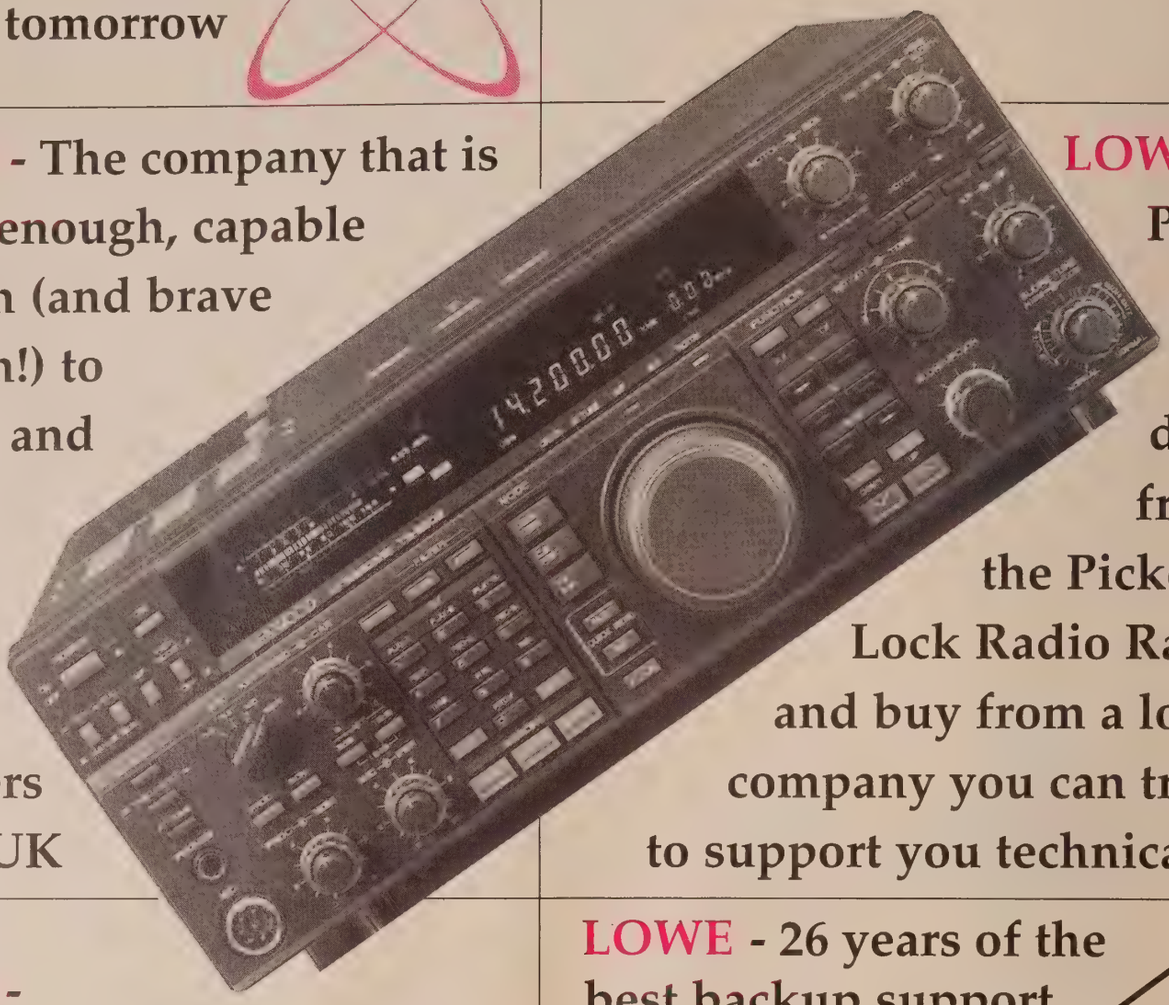

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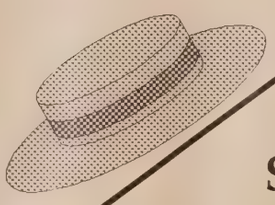

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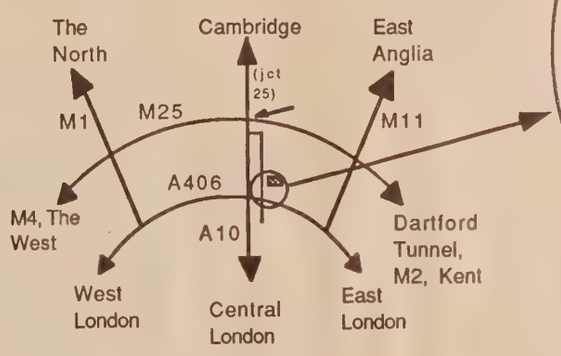


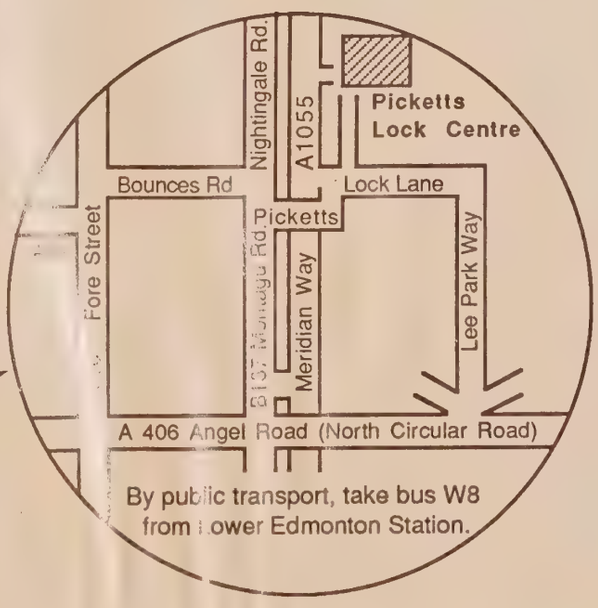


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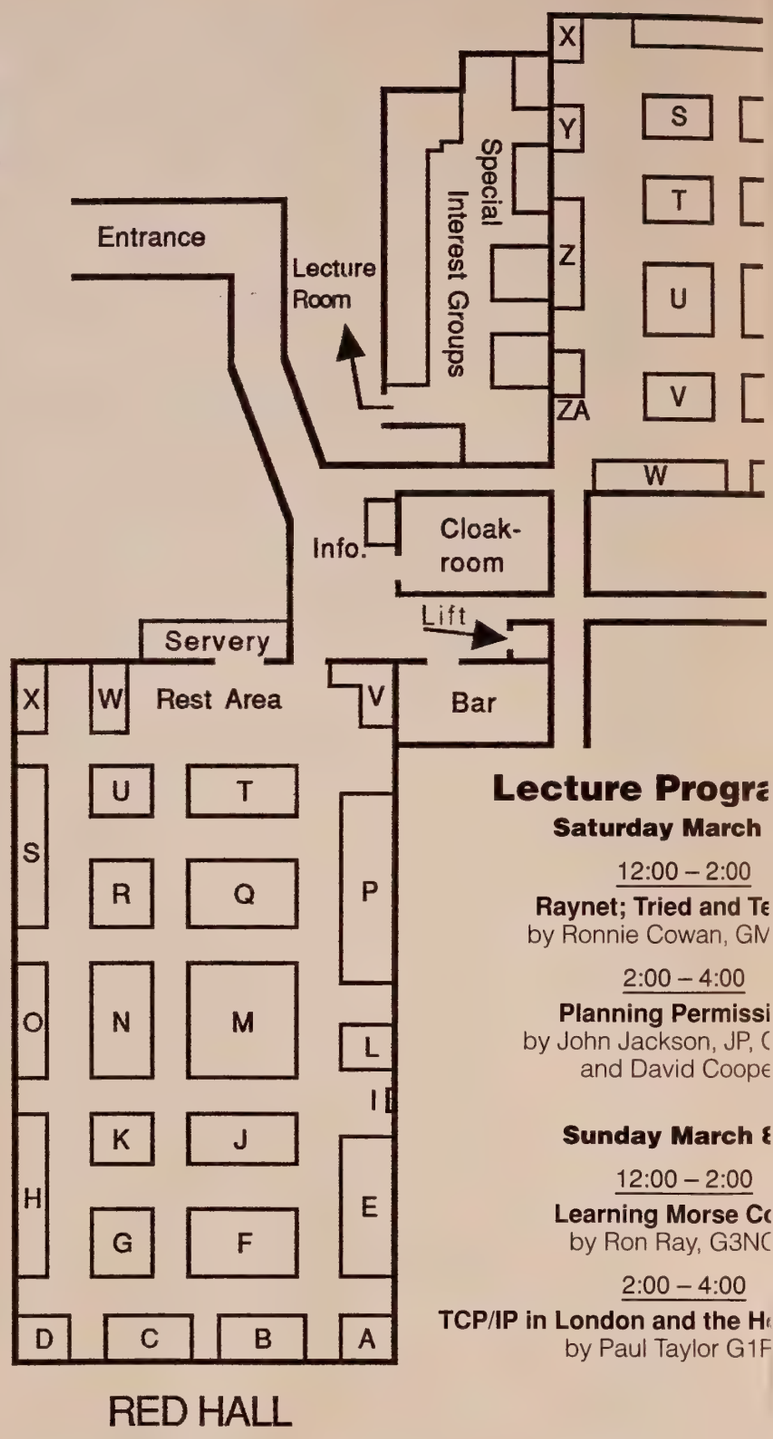
| Venus Electronics | V |
| Wraith & Co. | N |




**Lecture Progra**

**Saturday March**

12:00 – 2:00

**Raynet; Tried and Te**
by Ronnie Cowan, GM

2:00 – 4:00

**Planning Permissi**
by John Jackson, JP, C
and David Coope

**Sunday March 8**

12:00 – 2:00

**Learning Morse Co**
by Ron Ray, G3NC

2:00 – 4:00

**TCP/IP in London and the H**
by Paul Taylor G1F

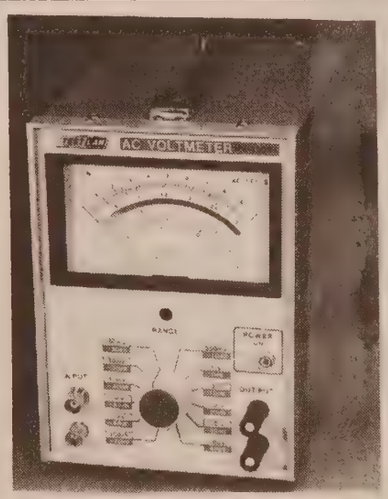
## SPECIAL INTEREST GROUPS
### Blue Hall Balcony

| COMPANY NAME | COMPANY NAME |
|---|---|
| Air Training Corps | Martelec |
| Amsat-UK | R.A.F.A.R.S. |
| Arnold G. C. & Partners | R.A.O.T.A. |
| British Amateur Tele Club | Raynet (North London) |
| B.Y.L.A.R.A. | Remote Imaging Group |
| Cheshunt Computer Club | Royal Naval A.R. Society |
| Grafton A.R.S. | Royal Signals Society |
| Guide Dogs for the Blind | Worked all Britain Award Group |
| I.S.W.L. | |

# GREENWELD
# WINTER SUPPLEMENT

***Hello and welcome to our latest supplement, full of warming winter cheer - and lots of bargains to boot!! Dip inside for a salubrious selection of sensational offers - Pages 1-9 feature new regular lines, whilst pages 10-16 give you the best surplus deals around!!***

***The Order Form is on Page 13 - so why not send off today? Orders are accepted by phone, fax, post or in person. We look forward to serving you.***




**AC MILLIVOLTMETER**

**Y134A** **MV3002A**

A highly sensitive and precise AC millivoltmeter used for measuring AC voltages in the range of 300μV to 100V between 5Hz and 1MHz. The output terminals allow this unit to be used as a wide-band high gain amplifier or pre-amplifier. Calibrated with AC volts and two decibel scales.

**Voltmeter:**
Voltage range ..... 300μ to 100Vac ±3%
Frequency range ..... 5Hz to 1Mhz
Input resistance ..... 10MΩ
Input capacitance ..... Below 50pF

**Amplifier:**
Output voltage ..... 1V no load
Frequency range ..... 10Hz to 500kHz
Output impedance ..... 600Ω ±20%

Power ..... 240Vac 50Hz
Dims ..... 142 x 195 x 205

**£60**

**A087D**

**MONO HEADPHONES WITH BOOM MIC**

Mono headphones with adjustable dynamic boom microphone. Tough plastic headband with chrome wire adjusters. Large, padded earpieces fully enclose the ears, deadening outside sound. High quality mylar transducers for clearer sound reproduction. Adjustable plastic covered sprung steel boom with directional mic. Straight screened lead terminates in colour coded plugs.

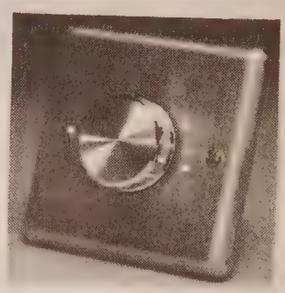
**Headphones**.....Mylar transducers
Impedance.....600Ω
Response .....100 - 20000Hz
Power.....200mW

**Microphone**.....Uni directional dynamic
Impedance.....200Ω
Sensitivity .....-80dB @ 1kHz

Lead.....1.75m straight screened
Plugs.....2 x 6.35mm mono
Weight .....320g

**£15.**

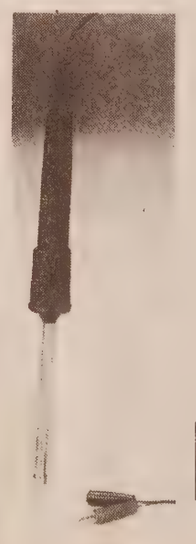
**Packed: BOX**



F455K **£3.50**

Brushed aluminium giving an attractive satin finish. Matching rotary on/off switch.

Rating..... 630W



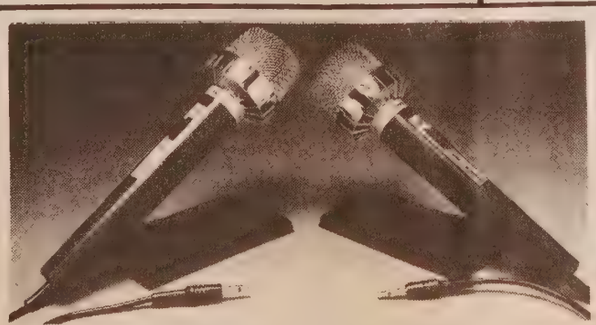
**Y060E**

**12 - 24V ac/dc**

Safety extra low voltage miniature soldering iron. Slim 6W element assembly with fine chisel point tip. 1.25m lead fitted with 2mm plugs. Individually packed on full colour presentation card.

Length.....170mm
Power .....12-24V ac/dc 6W

**£2.00**



**G170**

A carefully matched pair of dynamic micriophones. All plastic body, black and chrome finish, silver metal mesh head. Independent integral 1m leads termionating in 3.5mm jack plugs. Each with table top stand.

Type.....Omni-directional. Dynamic.
Impedance.....200 to 600Ω
Response.....90 – 11000Hz
Sensitivity.....–76dʃ @ 1kHz
Dia: Head.....40mm
Body.....21mm
Length.....155mm

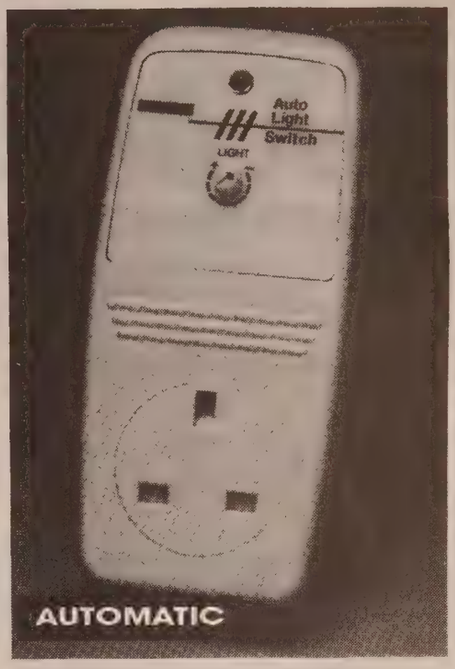
**£6.00**

**F606 £13.95** 6+ 9.92

**LIGHT ACTIVATED SWITCH**

Plug-in light activated switch, ideal for switching on lights automatically. When the ambient light level falls to a preset point power will be switched on to the built-in socket for a preset period of time. Light level and time-on period are fully adjustable.
Controls: Light level, time

Power .....220/240Vac 50Hz
Max. load.....500W

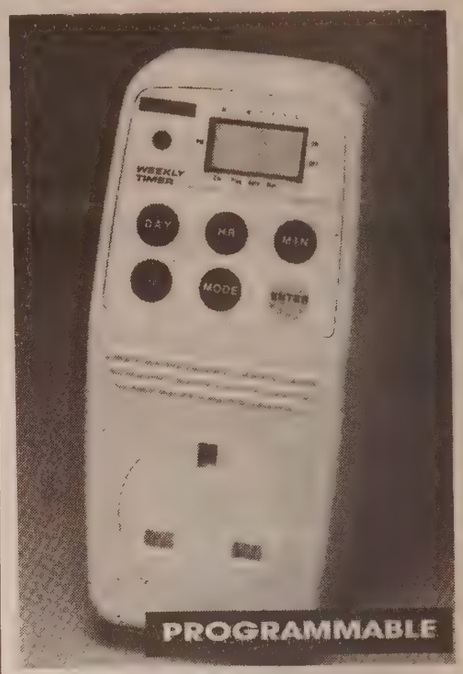



**F608 £11.95** 6+ 7.84

**AUTOMATIC LIGHT SWITCH**

Plug-in light switch which turn on table lamps, radios or other low power appliances (up to 500W) when the ambient light level falls below a preset level, switching off again when the light level rises.

Power.....220/240Vac 50Hz
Max. load .....500W
Dims.....145 x 65 x 42mm

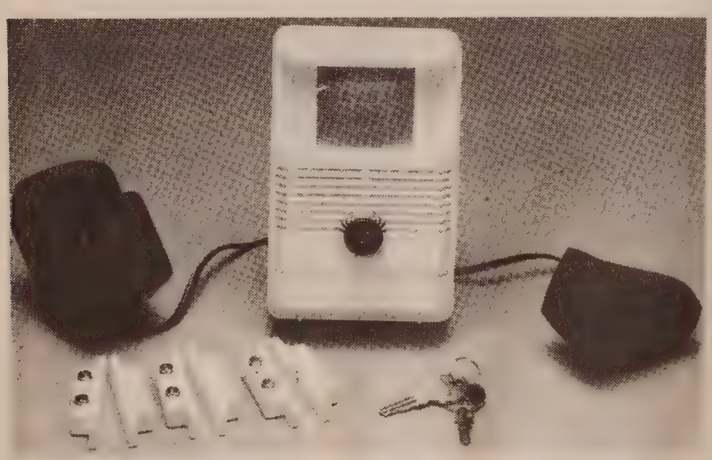



**F607 £21.95** 6+ 14.67

**PLUG-IN TIMER**

Plug-in timer capable of up to 56 programmable switching operations per week. The programming structure consists of 4 timed events occurring on each day, Monday to Friday and 4 timed events on both Saturday and Sunday (one event is an on/off cycle). The timer is simple to use and comes with full instructions.

Power.....220/240Vac 50Hz
Max. load.....3000W
Dims.....145 x 65 x 42mm

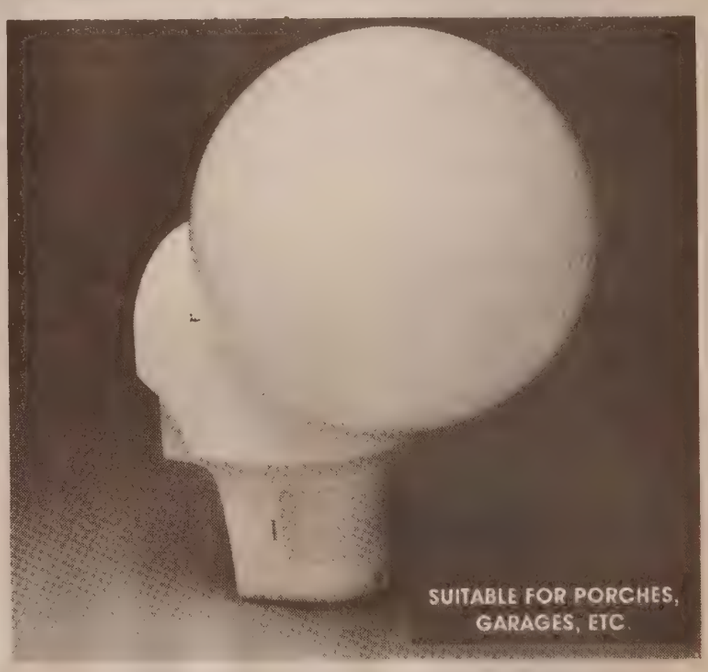


**F653 £47.95** 3+ 31.89

**PIR ALARM KIT**

A compact PIR alarm kit, ideal for small home installations, garages, caravans, trailers, trucks, boats, etc. The kit contains a combined PIR and alarm box, 3 magnetic reed switches, compact siren and power supply. Instruction manual and fixing screws included. An alkaline PP3 can be added for power failure protection.

PIR coverage .....100m²
Exit delay.....2.5 minutes
Entry delay .....15 seconds
Alarm reset time.....60 seconds
Power .....12Vdc or AC adaptor
Dims.....140 x 90 x 56mm (alarm panel/PIR )




**L134 £34.95** 4+ 23.72

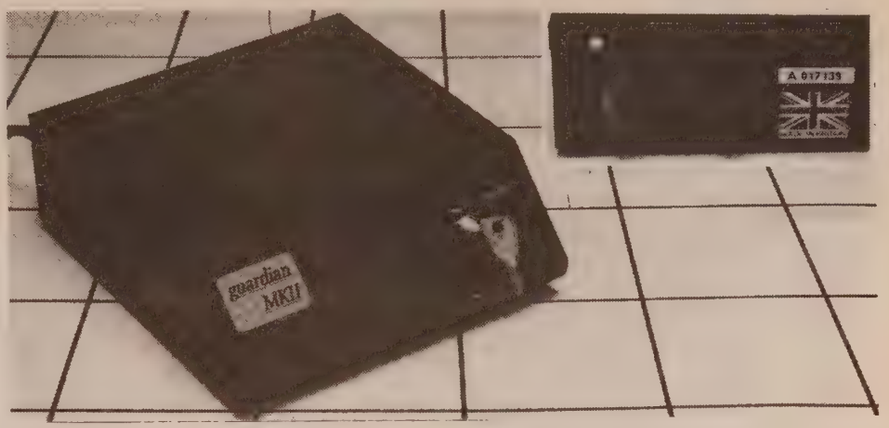
**PIR GLOBE LIGHT**

A stylish globe shaped lamp with built-in PIR detector which reacts to body heat, switching on the lamp whenever somebody is within the detection zone. A photo detector built into the unit prevents daylight operation. The sensitivity (detection range) is adjustable. Power: 220/240Vac 50Hz.

## T072A £29.95 4+ 19.70

MESSAGE RECORD AND PLAYBACK

**T072A ANNUNCIATOR**
A stand alone PIR message annunciator on which your own message, up to 20 secs long can be recorded on a microchip and played back every time someone is detected by the PIR. The recorded message can be speede up or slowed down by a rotary control on the side. The message can be over-written at any time.. Note: The message will be lost when the power is switched off.
**Dims:** 92x136x46
**Power:** 4xAA cells or external 6V .

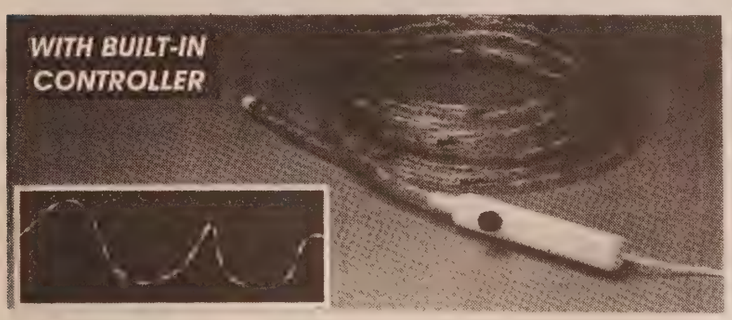



## F650 £95.00 5+ 60.30

**VOLUMETRIC ALARM**

A self-contained burglar alarm whch requires nothing more of the user than to plug it in and switch it on, no further wiring is necessary. The alarm works by monitoring the air pressure around it, any change such as opening a door or window in the building will trigger the alarm 80 seconds later, unless the alarm is switched off by the key. An additional external alarm box is available (F651). Built-in back-up batteries prevent the alarm from being switched off by unplugging.

| | |
|---|---|
| Exit delay time | 40 seconds |
| Entry delay time | 20 seconds |
| Power | 220/240Vac 50Hz |
| Dims | 174 x 60 x 190mm |

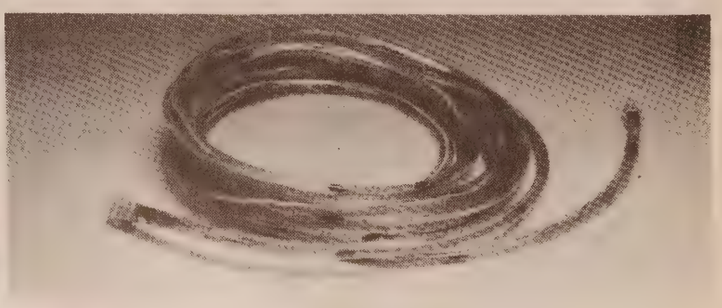



## G008S £39.95 3+ 26.13

**ROPE LIGHT**

Self contained 3-colour rope light with built-in speed controller. 3 circuits of 20 lamps within a tough, blister effect 6m tube.

| | |
|---|---|
| Length: | 6m |
| Power: | 220/240Vac 50Hz |

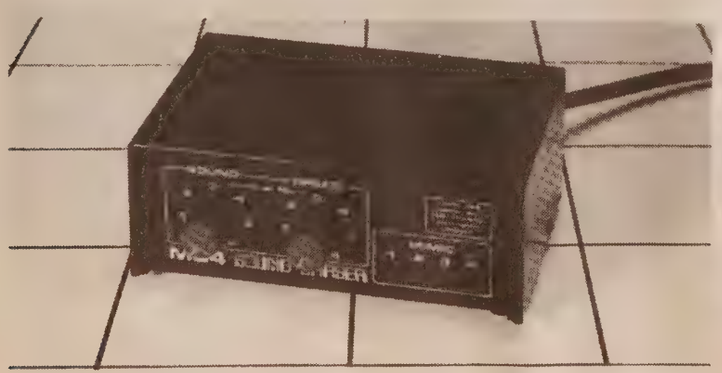


## G008RA £21.95 3+ 14.67

**ROPE LIGHT**

5m tough but flexible plastic tube rope light. 4 circuits of 20 coloured bulbs. May be connected end to end to increase length. Suitable controller: G006M.

| | |
|---|---|
| Length | 5m |

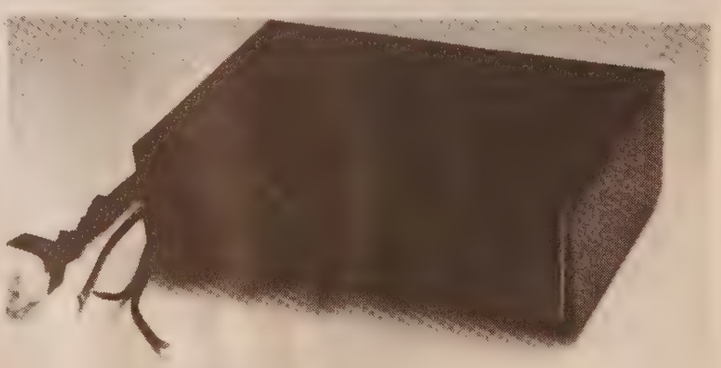


## G006P £39.95 3+ 26.73

**4-CHANNEL CONTROLLER**

4-channel lighting controller with built-in mic, sensitivity control and speed control. Four front panel LEDs mimic the lighting effect. Output via 8-pin Bulgin socket

| | |
|---|---|
| Max output | 1000W/channel resistive |
| | 600W/channel inductive |
| | 2500W total |
| Power | 220/240Vac 50Hz |
| Dims | 184 x 100 x 55mm |



## G006M £49.95 3+ 32.83

**4-CHANNEL CONTROLLER**

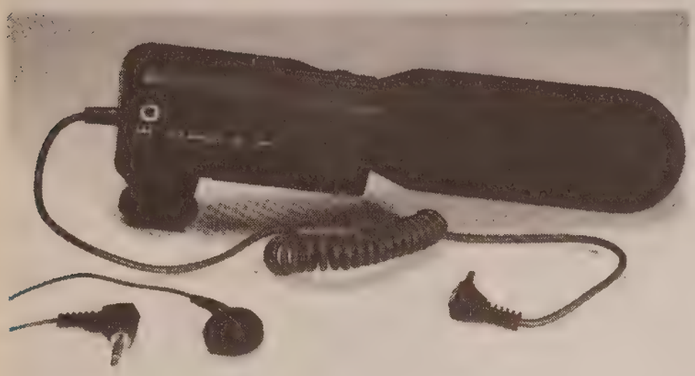
4 channel lighting controller with five built-in sound activated effects: 1 on/3 off, 2 on/2 off, 3 on/1 off, 4 on/0 off plus random, forward and reverse for all four sequencies. Outputs via Bulgin socket and short lead with connector for rope lights.

| | |
|---|---|
| Max output | 1000W/channel, |
| | 2500W total |
| Power | 220/240Vac 50Hz |
| Dims | 184 x 100 x 55mm |

PRICES IN **BOLD** TYPE INCLUDE VAT: PRICES IN LIGHT DO NOT

# VIDEO/AUDIO BARGAINS!

## ENHANCE YOUR HOME VIDEOS WITH THESE PRODUCTS!!

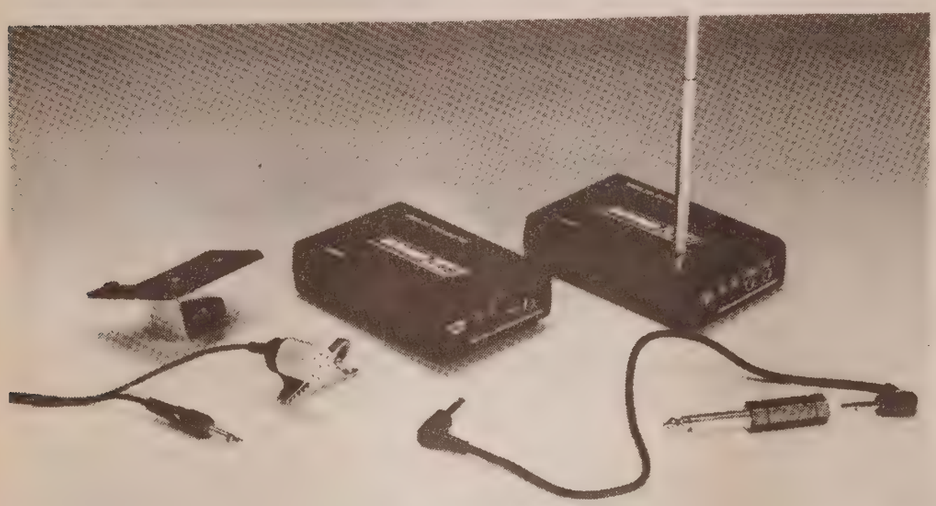


### G164G £32.95 3+ 22.11

**CAMCORDER DUBBING MIC**

A unique mic designed for direct dubbing of an external soundtrack, voice-over, etc. at source, whilst the camcorder is recording. A stereo 3.5mm input is provided in the side of the mic for insertion of the soundtrack and a rotary control provides balance between mic and soundtrack. An earphone jack is provided for monitoring the mix. Supplied with a mono in-ear phone.

Type .....Super uni-directional electret condenser
Impedance.....1kΩ
Response.....80-15000Hz
Sensitivity.....-48dB (@ mix max.)
Length.....185mm



### G211 £49.95 2+ 35.52

**WIRELESS MICROPHONE**

A 3-channel 2-part wireless microphone system designed for use with video cameras. The tie-clip mic has a remote belt clip transmitter with on/off switch. The receiver has a hot shoe for mounting on the video camera. The system allows greater mobility with a microphone than can be achieved with the camcorder mic.

**WITH VINYL CARRYING CASE**

### T081 £47.95 3+ 32.09

**VIDEO LIGHT**

30W halogen video light with 6V 1700mAh battery pack. The video light is provided with a synchronisation lead which, when the light is switched to "remote", allows the light to switch on when the camcorder is switched on (Sony and Panasonic camcorder). The on/off/remote switch has a lock button to prevent accidental movement.

**Packed: BOX**

**T081AA**
Spare bulb **£4.95** 5+ 3.28

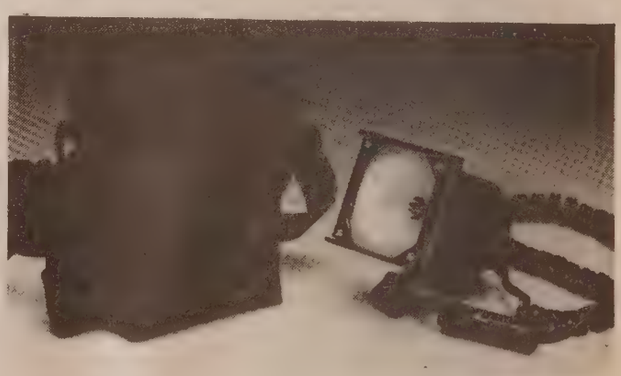
### T081A £15.95

**VIDEO LIGHT** 4+ 10.63

30W video camera light with hot shoe fitting and power on/off switch. Accepts 6V 1700mAh battery pack (Sony NP55 and NP77 typically)

**Packed: BOX**

**T081AA**
Spare bulb **£4.95**



### T081B £66.95 3+44.89

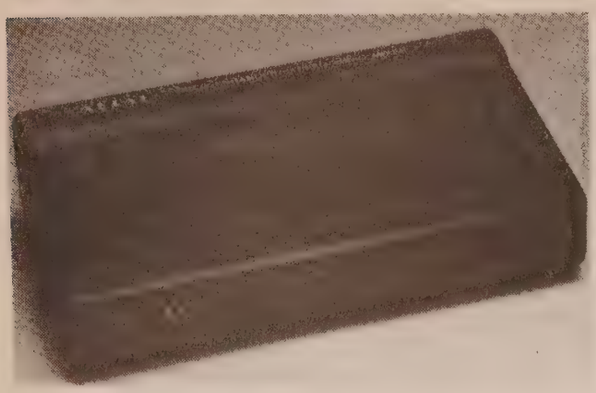
**VIDEO LIGHT KIT**

A semi-professional video light kit comprising 100W halogen lamp, remote 12Vdc 7Ah sealed lead acid battery in carrying case with shoulder strap, 220/240Vac operated battery charger and camcorder power supply adaptor.

**Packed: BOX**

**T081BA** Spare bulb **£3.75** 5+ 2.80

**PRICES IN BOLD TYPE INCLUDE VAT: PRICES IN LIGHT DO NOT**



## T128D £36.95 5+ 24.79

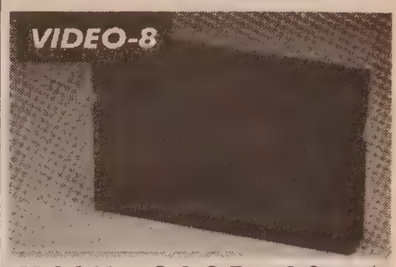
**VIDEO ENHANCER/AUDIO MIXER**

A 3-channel stereo video sound mixer with a built-in video enhancer, specificially designed for video dubbing. The audio input from the camera/VCR, mic and music sources can be mixed at will, with overall output conrolled by a master slider. The video enhancer will clean up the picture on older recordings. Powered by an external 12Vdc power supply (not supplied). Complete with all connecting leads and adaptors.

## T122D £12.95 10+ 8.56

**VHS-C TO VHS ADAPTOR**

All mechanical adapter cassette allowing the playback of VHS-C tapes on VHS video players. The action of closing the door moves the tape into position.




## T122K £6.95 10+ 4.80

45 minute tape.

## T122J £6.95 10+ 4.80

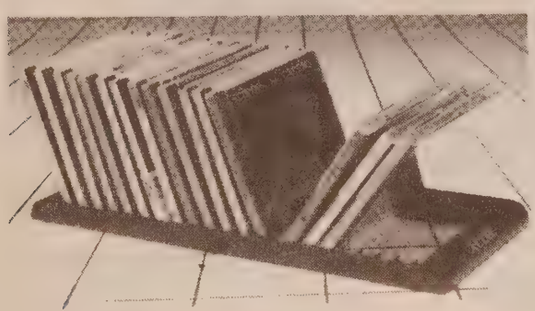
30 minute tape.

## GAFFA TAPE

50m rolls of 2" wide self adhesive Gaffa tape

**L099R Silver £6.50** 10+ 4.36

**L099S Black £6.50** 10+ 4.36



## A163A £2.95 40+ 1.03

**CD RACK**

A unique CD storage system which will hold up to 20 CD's, in their cases, allowing them to flip back and forth as you search for the CD you want. Free standing and interlocking.

## DC POWER LEAD

Useful universal lead - reversible socket on the end of a DC power lead with 4 interchangeable plugs - 1.3, 2.1, 2.5DC & 3.5mm mono jack. 1.8m long.

**A133A £1.25** 50+ 0.75

## A005A £27.95 5+ 19.03

**STEREO PRE-AMP**

Mains powered stereo pre-amp suitable for insertion between turntables, mics and other low level sources and aux/line inputs on mixers, amps, stack systems etc.

| | |
|---|---|
| Input impedance | 50kΩ |
| Max. input level | 33mV (@ 1kHz) |
| Max output level | 3.8V (@ 47kΩ load) |
| S/N ratio | more than 50Hz |
| Input sensitivity | 2.5mV (output 300mV) |
| Frequency response | 30 - 15kHz (RIAA) |
| Power | 220/240Vac 50Hz |
| Dims | 140 x 75 x 40mm |

## G170C £5.95 10+ 3.35

**DYNAMIC MIC 200Ω**

Pair of matched dynamic microphones. Black plastic body with chrome metal grille and chrome trim. On/off switch. Independent 1.2m leads terminating in 3.5mm jack plugs. Mic stands and 6.35mm adaptors included.

| | |
|---|---|
| Type | Omni-directional dynamic |
| Impedance | 200Ω |
| Response | 90-10000Hz |
| Sensitivity | -76dB @ 1kHz |
| Dia: Head | 32mm. |
| Body | 17mm |
| Length | 120mm |

## A170A £2.95 10+ 1.88

**TAPE HEAD DEMAGNETIZER**

A compact and easy to use tape head demagnetizer. Simply plug the demagnetizer in, press the red button and place the tip gently in contact with the tape head. Rotate the tip across the surface and withdraw slowly. Demagnetizng every 50 hours of play time improves playback and record quality.

Power: 220/240Vac 50Hz

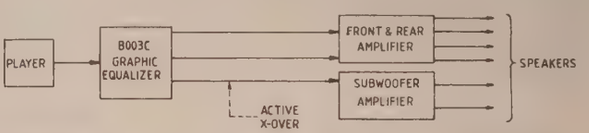
**PRICES IN BOLD TYPE INCLUDE VAT: PRICES IN LIGHT DO NOT**

## B003C £39.95 5+ 26.40

**GRAPHIC EQUALIZER**

11-band graphic equalizer with sub-woofer output and CD input. The sub-woofer output has an adjustable cut-off frequency and level control. The case is standard DIN width for in-dash or under-dash mounting. Low level inputs and outputs only, via phono sockets.

Frequency response .....20 - 25000Hz
Total harmonic distortion .....Less than 0.05%
S/N ratio .....85dB
Separation .....65dB
Control frequencies.....60, 120, 250, 380, 500, 750, 1k, 2k, 4k, 8k and 16kHz
Control range .....12dB boost or cut
Power .....12 - 14Vdc
Dims .....178 x 25 x 140mm



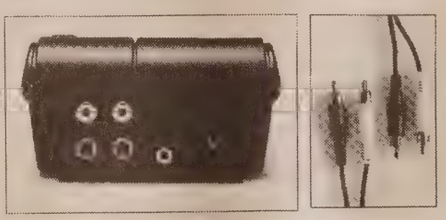
## A085 £99.95 2+ 73.70

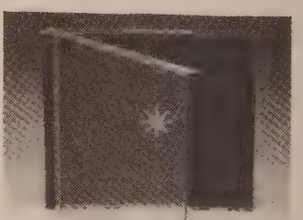
**RADIO HEADPHONE SYSTEM**

A radio headphone system comprising a radio transmitter, a belt-clip receiver and a pair of high quality headphones. The transmitter will accept inputs from three separate sources; CD, DAT, tape etc and additionally has a built-in mic with talk button for contacting the headphone wearer. The system allows complete freedom of movement within a range of approximately 100 feet of the transmitter.

**Transmitter:**
Input sensitivity.....Source 1 & 2: 10kΩ/100m
.....Source 3: 22kΩ/100m
Power .....12Vdc 150mA

**Receiver:**
Frequency response.....48 - 16000Hz
Power output.....30mW/channel
Range.....100ft (36m)
Power supply .....PP3 battery
Battery life .....8hrs nominal





## A162B £1.20 50+ 0.66

**REPLACEMENT CD CASES**

Replacement CD storage cases designed to be direct replacements for the originals supplied with compact discs. Two cases per pack.

GREENWELD ELECTRONIC COMPONENTS

## A087F £8.95 10+ 5.15

**STEREO HEADPHONES WITH BOOM MIC**

Lightweight stereo headphones with adjustable dynamic boom mic. Tough plastic headband with stainless steel adjusters. Foam padded earpieces containing high quality samarium cobalt transducers for clear sound reproduction. High sensitivity miniature dynamic mic cartridge with foam windshield. Straight screened lead terminates in 6.35mm stereo plug for headphones and a 3.5mm mono plug for mic.

**Headphones:**
Type.....Mylar transducer
Impedance .....32Ω
Response.....20 - 20000Hz
Power .....150mW

**Microphone:**
Type .....Omni-directional dynamic
Impedance .....250Ω
Sensitivity.....-78dB @ 1kHz

**General:**
Lead .....2.5m straight screened
Plugs .....6.35mm stereo and 3.5mm mono
Weight.....80g

## B049A £12.95 6+ 7.50

**12Vdc TRAVEL KETTLE**

12Vdc kettle complete with mounting stand, cup and cup holder with a self-adhesive base. Plugs directly into a car cigar lighter socket for power. A power-on light is provided at the base of the kettle. Ideal for cars, vans, campers etc.

Capacity.....0.5 pints (0.3lts)
Power.....12Vdc 9A, 14Vdc 11A
Dims.....143 x 125 x 112mm (approx)

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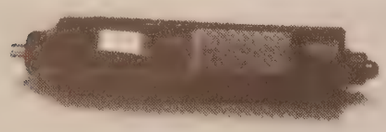

## B200Z £1.95 20+ 1.14

**PLUG-IN FLASHING LED**

A flashing LED built into a car cigar lighter plug to give visual warning that an alarm is activated (whether or not an alarm is fitted). Simply plugs into the car's cigar lighter socket.

---

## B201 £17.95 10+ 11.93

**CAR ALARM**

Keyless, self-contained car alarm with simple, three wire connection into the car's wiring harness. The alarm is self arming one minute after the ignition is switched off. The alarm is current sensing and will operate 10 seconds after a door is opened. Once triggered the alarm will sound for 30 seconds before re-setting.

Operation.....Current sensing
Reset time.....45 seconds
Power.....12 - 14Vdc

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## B047D £12.95 10+ 8.84

**AIR PURIFIER AND IONIZER**

A compact, stylish ionizer and air purifier with a coverage volume of 14m³. Ideal for in car use with the DC lead provided or as a room purifier with the AC adaptor provided. Removes unpleasant smells, airborne dust, bacteria, tobacco smoke etc.

Power.....9-15Vdc or 220/240Vac via adaptor
Dims.....160 x 95 x 43mm

## B047E £9.95 10+ 6.50

**AIR PURIFIER AND IONIZER**

A compact, stylish ionizer and air purifier designed specifically for car, truck and bus use with a coverage volume of 14m³. Removes unpleasant smells, airborne dust, bacteria, tobacco smoke etc. Supplied with a double sided self adhesive pad.

Power.....12Vdc 1.8W
Dims.....110 x 110 x 65mm

**PRICES IN BOLD TYPE INCLUDE VAT: PRICES IN LIGHT DO NOT**

## Y122HR £99.95 2+ 66.73

**10MΩ**

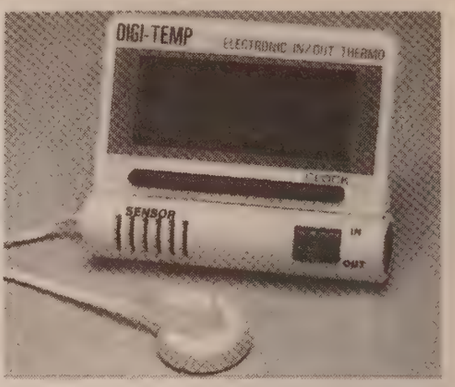
The Y122HR (M3650CR) multimeter is capable of communicating either the current LCD readout or up to 5 stored measurement values direct to data acquisition systems, PC's, pen plotter, printer, etc. via its MT/RS232C interface cable. Interface cable and program disc included with meter.

- ★ 3.5 digit 17mm LCD display
- ★ 30 ranges including 20A ac/dc
- ★ Data hold
- ★ Max/min value capture
- ★ 40 point analog bargraph
- ★ Frequency counter
- ★ Logic test with auto level
- ★ Capacitance test
- ★ Continuity test with buzzer
- ★ Transistor and diode test
- ★ Built and tested to IEC 348
- ★ Fully shrouded test leads

Battery, instruction manual and carrying case included.

| | |
|---|---|
| AC volts | 0-200m-2-20-200-750Vac ± 0.8% |
| DC volts | 0-200m-2-20-200-1000Vdc ± 0.3% |
| AC current | 0-2m-200m-20Aac ± 1.8% |
| DC current | 0-200µ-2m-200m-20Adc ± 0.5% |
| Resistance | 0-200-2k-20k-200k-2M-20MΩ ± 0.5% |
| Capacitance | 0-2000pf-200n-20µF ± 2.0% |
| Frequency | 0-20k-200kHz ± 2.0% |
| Transistor hFE | 0-1000 NPN/PNP |
| Dims | 176 x 90 x 36mm |

**Packed: BOX**




## Y137M £8.95 5+ 6.03

**DIGITAL THERMOMETER**

A dual sensor digital thermometer designed for comparative temperature measurement, for example inside/outside temperature. The thermometer can be free standing or mounted with the Velcro strips provided. The remote sensor is fitted with a 3m lead and mounted with double sided tape. A digital clock is built in.

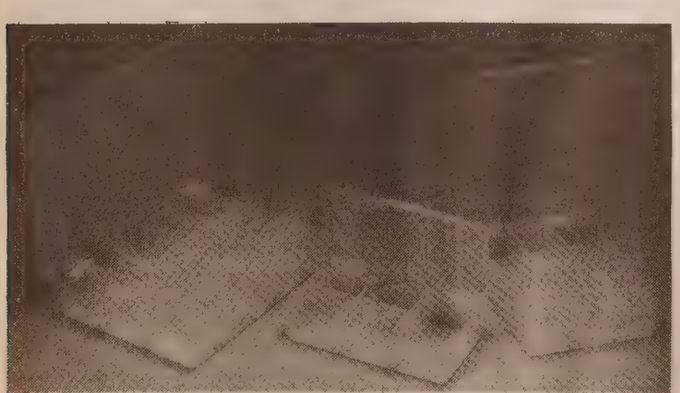
| | |
|---|---|
| Temperature range | -20 O to +70OC ± 1OC |
| Resolution | 0.1OC |
| Power | P009H button cell |

## Y137N £11.95 5+ 7.50

**DIGITAL THERMOMETER**

Dual channel inside/outside comparative temperature thermometer with dual readout display. Dual thermocouple, one internal and one on a 3m extension lead. Free standing or double sided tape attachment.

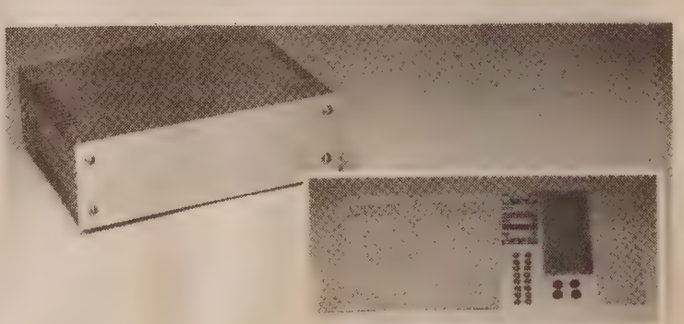
| | |
|---|---|
| Temperature range | –50 to +70°C |
| Power | 1 x P009H battery |
| Dims | 107 x 25 x 13mm |



**COMPARTMENT BOXES**

A range of three strongly constructed polypropylene compartment storage boxes with hinged lids. Semi-transparent finish.

| | | | |
|---|---|---|---|
| **F662** | 180 x 97 x 43mm 5 compartments | **£1.20** | 40+ 0.74 |
| **F662A** | 185 x 142 x 42mm 9 compartments | **£1.60** | 40+ 1.03 |
| **F662B** | 275 x 180 x 42mm 18 compartments | **£1.99** | 40+ 1.33 |



**METAL CASES**

A range of flat pack steel cases with aluminium front and rear panels. Rust proof finish, ready for painting.

| Ref: | Size | | |
|---|---|---|---|
| **F660** | 80 x 46 x 85mm | **£3.96** | 10+ 2.65 |
| **F660A** | 110 x 50 x 80mm | **£4.78** | 10+ 3.20 |
| **F660B** | 140 x 56 x 110mm | **£5.96** | 10+ 3.99 |
| **F660C** | 180 x 56 x 130mm | **£7.90** | 10+ 5.29 |
| **F660D** | 230 x 56 x 190mm | **£10.99** | 10+ 7.37 |

## Y030B £12.95
5+ 8.01

**PRECISION TOOL SET**

5-piece precision, pressed stainless steel tool set with precision ground blades. The set comprises side cutters, bent nose pliers, round nose pliers, long nose pliers and flat nose pliers. Sprung, insulated handles.

Length.....4" (100mm)

## A150B £6.95
**MINI VACUUM CLEANER** 10+ 3.95

A battery powered mini vacuum cleaner which is ideal for removing the dust from turntables, cameras, video recorders, computer keyboards etc. 5 piece kit. Powered by four AA alkaline battieries (not supplied).

Power .....4 x AA alkaline batteries

## Y060S £6.95 10+ 4.42
**PORTABLE SOLDERING IRON**

Battery operated portable soldering iron. Powered by 4 'C' cells in the handle (not supplied). Tip heats up in seconds from operation of the biased off slide switch. Tip retracts into the body for safety. Supplied with one spare tip and 300mm of solder.

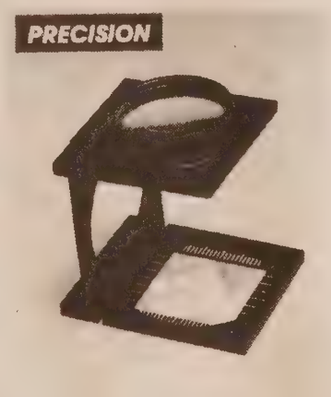
Power .....6Vdc (4 x C cells)
Dims.....190 x 66 x 30mm

## Y006E £6.95
10+ 4.29

**PRECISION MAGNIFIER**

Precision made magnifer with a fixed focus. The lens fits directly over a graduated scale for magnified measurement. Metric and imperial scales. All metal construction. Folds down for storage in the vinyl wallet provided.

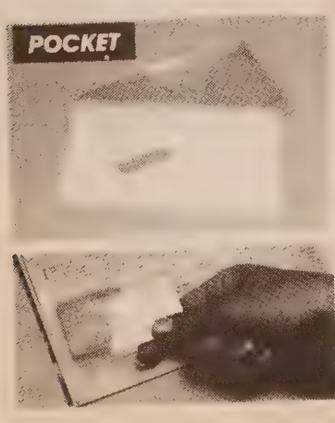
Dims.....53 x 48 x 39 (in use)
.....47 x 39 x 14 (folded)



## Y012C £9.95
10+ 6.67

**40-PIECE TOOL KIT**

A 40-piece tool kit comprising a ratchet driver handle with a lockable knuckle, 100mm extension bar, 7 torque driver tips, 8 hex key tips, 6 screwdriver tips, 2 square drive tips, 1 hex to square drive adaptor, 7 metric sockets and 7 imperial sockets in a hinged plastic case.




## Y006C 35p
100+ 0.19

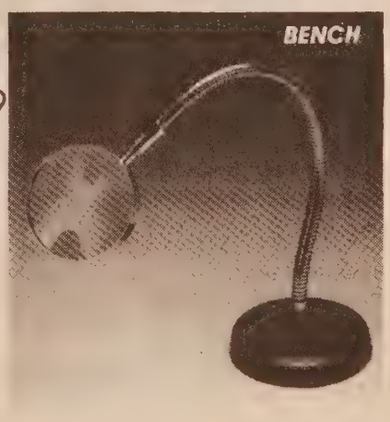
**PRISMATIC MAGNIFIER**

Credit card size prismatic magnifier. All plastic. Set of 10 on a presentation card.

## Y006D £7.95
10+ 5.29

**GOOSENECK MAGNIFIER**

2X magnification 3" diameter on a flexible 13" gooseneck with heavy base. Useful for close, precise work.



**January 1992**

***A Happy and Prosperous New Year to all our customers – and our thanks for supporting us over the years. We hope you've found our Bargain Lists interesting – our aim is to bring even more exciting surplus components and equipment to you over the coming months – but to be sure of not missing these amazing offers, you should take out a subscription. For just £2.00, we'll send you the next 6 lists as soon as they are issued together with a first class reply paid envelope and details of goods only available in small quantities, and not listed elsewhere..***

***This list, 77, is a compilation of earlier lists with a few new bits thrown in for good measure – but as ever order soon, because once sold our special offers are rarely repeatable!***

**PS** There wasn't room for some sections in these pages – if you're a Bargain List sibscriber, they're enclosed on an extra sheet. If you're not, send an SAE for the **RESISTORS, HARDWARE, FUSES, SURFACE MOUNT, MISC** and left-overs from the **CHRISTMAS LIST** – + some new lines just arrived.

## CAPACITORS

**Z5218** 22,000$\mu$F 16V electrolytic can 35mm dia x 102mm long. Tag ends. Silly price – **only £1.00 each**

**Z2446** 10,000$\mu$F 35V PC mntg radial electrolytic. Nice compact component 25.2diax51mm high. 10mm pitch. **Only £1.00**

**K265** 4700uF 40V Phillips can, PC mntg 47x35 dia. **2 for £1.00**

**Z5180** 1000uF 10V radial electrolytic by Nippon 13 dia x 25mm. **Pack of 10 £1.00** 100+ 0.05

**Z4406** 470uF 400V 84x51mm screw terms **£3.00**

**Z5181** 330uF 16V radial electrolytic by ITT. 13dia x 21mm. **Pack of 14 £1.00** 100+ 0.035

**Z4429** 2.2uF 630V 20% 46x31x24mm axial leads **5 for £1.00**

**Z1529** 0.22uF ceramic cap. 5mm pitch. **Pack of 30 £1.00**

**Z1965** 0.01uF disc ceramic 6mm dia. **Pack of 40 £1.00**

**Z2390** Special price on high voltage caps – 0.47uF 630V by EFD. **Pack of 3 £1.00**

Solid dielectric trimmer caps in 3 values, all PC mounting:

**Z2454** 5.5pF Phillips 808 series, polyethylene film DP 36p **8 for £1.00**; 100+ 0.06

**Z2455** 10pF Phillips 809.05 series PTFE film. DP 1.66 **3 for £1.00;** 100+ 0.15

**Z2456** 18pF As above, **3 for £1.00;** 100+ 0.15

## PANELS

**Z5203** Relay panel – some panel, this! 50, yes 50 DPCO 24V DC min relays, Omron type G2V (our type W834) on PCB 230x160mm with 2xDIN41612 64 way plugs. At 1 off prices, this would cost around £100, but you can have a complete panel at just 20p per relay – **that's only £10.00!**

**Z5217** Relay panel – Eurocard 160x100mm with 64 pin DIN41612 plug, containing 8 x Omron G2V 24V min DPCO, LS00, 125 and 14 all in sockets, 4 red LED's, R's, C's, etc. **£2.00**

**Z5244** Mosfet panel: 56 x VN0808M (DP 1.01 each!) 80V N-channel 1W 2A device in TO237 case + 28 x ILCT6 8 pin opto isolators, also 30+ CMOS, 74SC etc; 26 SIL networks, 56 0.1uF caps and a few other odd bits. **Super value – only £7.50**

**Z5231** Memory panel, contains 208 4164 64k RAM chips all in sockets. **£30.00**

**Z5232** As above, but chips are soldered in. **£20.00**

Along with the panels **Z5231/2** mentioned on page 12 (which are here now) there are a great many packed with hi-tech chips – not just 74LS, but Z80 and other processor chips, EPROM's etc. The boards are 430x320mm and mostly contain over 250 chips, date coded '84. **Order Code Z8967** – clearing at **£5 per panel** – but to get a good mix, you'll need 2 or 3 boards.

More GEC Cablevision units – these were the rack mounted distribution panels. 2 types available as below:

**Z5204** Diecast housing 252x140x25mm (subscriber module) contains PCB with lots of nice high frequency bits, much of which is containedwithin 2 diecast boxes bolted on to the board. Most of the transistors (there are 17 of them) are BF980, BFR90A/91A BFW92 etc. Single output socket, 2 DIN41612 plugs. **Great value at £4.50**

**Z5205** Larger diecast housing 252x140x57mm with 2 PCB's each containing a number of HF parts, pot cores, crystals, etc. These are input modules – 1 traffic and 1 data panel **£4.40**

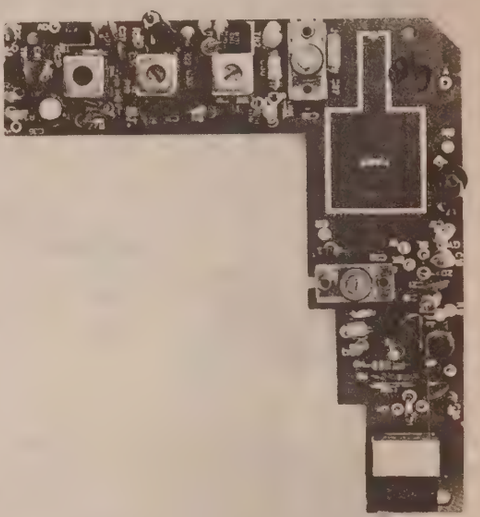
**Z4295** Although listed in our main Bargain List, we have large stocks of this panel, and it's not selling very quickly – although it contains a number of interesting and useful parts. There's a 27C64 Eprom in a socket, 80C85A microprocessor, 2x82C51A support chips + 5864 RAM, as well as 8x74HCT chips. There's a small length of ribbon cable to a small sub-panel with 2xMC1488 and 1489, and 3 DIL header plugs. These error correction cards by Tulsedata originally cost over £70 each – they were in last year's catalogue at £10, reduced this year to £5. Will you buy them at **£2.50?**

**Z1641** PCB. Printer driver board by Teijin. Contains M5L8041A, 8x74 series, 3.579545MHz xtal etc **£2.00**

**Z5167** 'S' module-like Z492/3. 11 pin plug in module 80x50x50mm with a small PCB inside containing 2xBC184L, R's, C's, etc. **4 for £1**

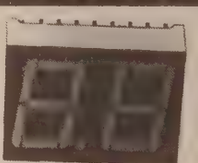
**Z5210** Power supply panel – PCB 150x65mm that has been partially assembled but nit soldered. Contains 79M05, 741, BDX339, FRC730, 4x1N4001, 10,000uF 10V cap + R's, C@s etc. (No transformer) **Only £1.00**

**Z5211** Another smaller PSU panel 97x55mm, again not soldered. Each board contains 9x1N4001, 121C thermal fuse etc. **8 panels (72 rects) for just £1.00**



**Z911** Found some more of this useful 135x135 L shaped panel – nearly a complete radio front end. Although the tuning cap is missing, there are 2 trimmers, IFT's, lots of R's and C's, 2xBF241 FET, BF194, BC208A, 2xBC148C, 2xBC149C etc. Best of all, the board hasn't been soldered, so the components are easily removeable. All this for just **£1.00**

## OPTO



**Z2434** Dual 7 seg LED , type TDDR5250 by TFK. Red common anode 13mm digit height. DP 1.14. Our special low price (we have 10000 to clear) **2 for £1.00;** 100+ 0.25; 1k+0.18

**Z2435** Single 7 seg LED 10mm high digit. Type LN514RK. Common cathode. **4 for £1.00;** 100+ 0.15; 1k+ 0.10

**Z2362** MS463M 0.6" common cathode 4 digit multiplexed display on PCB 70x30 with 15 way connector. Intended for digital clock use. Supplied with pin out. **ONLY £1.50**

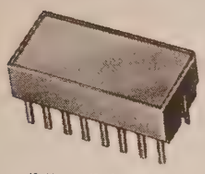
2 more LCD's in small quantities, both fitted with pins:

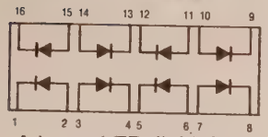
**Z2357** 6 digit 0.5" 50 pin device **£2**

**Z2358** 2 digit 0.5" 18 pin device **£1**

**Z2432** LCD 8 digit 10mm high. Single sided 36 way edge connector. **Only £2.00** 100+ 1.00 1k+ 0.80

## LED BAR MODULES



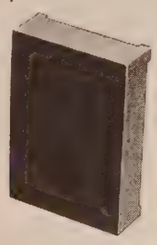



A couple of large LED light bars in 16 DIL package, 10mm high. Made by HP.

**Z2462** HLMP2685 HE red 80mcd @ 20mA. DP 2.19. **Our price £1.00;** 20+ 0.70

**Z2463** HLMP2785 Yellow 70mcd @ 20mA. DP 2.19. **Our price £1.00;** 20+ 0.70

Using these. you could build up a massive 7 seg display – each module being 1 element. (In practise, to maintain proportions, you'll need 10 displays for each 70mm high digit – details on request)



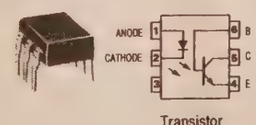
**Z1854** 7 seg LED 81720R – giant 1" digit, red. Common anode. **£1.00 each**
**Z1855** As above but common cathode **£1.00**
**Z1856** Dual 7 seg LED LB6410 green 0.56". **2 for £1.00**
**Z1857** Single 7 seg LED LA6480, matches above – green 0.56" **4 for £1.00**
**Z1858** 7 seg LED LA301MA green 0.3", CA. **4 for £1.00**
**Z1859** 7 seg LED LA301MK green 0.3" CK **4 for £1.00**

**Z2436** 3mm red LED's with preformed cropped leads 7.5mm long. Super buy for quantity user – **pack of 100 £3.00** 1000+ 0.02

**Z2461** PC mntg packaged red LED – mounts at right angles to PCB. 10.5x8x3.9mm. LED is 3mm. Ore type 9301A. **Pack of 10 £1.00** 100+ 0.05; 1k+ 0.04

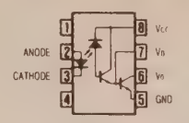
**Z1934** Stackable red LED – white casing round 6x3.5mm. **Pack of 10 for £1.00**

**Z1932** Red square LED with rounded corners, 5mm. Pack of 15 **for £1.00**
**Z1933** Thin rect. red LED – 5x1.5mm. **Pack of 20 £1.00**



Transistor

**Z2467** 4N25 optocoupler – transistor output. DP 0.80. **Our price 3 for £1.00**
**Z2469** CNY17–1B optocoupler, transistor output 6DIL. DP 0.67. **3 for £1.00**

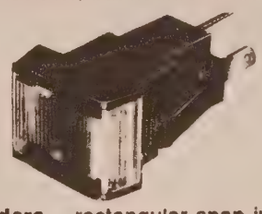


6N139 HCPL2300

**Z2468** 6N139 optocoupler – darlington. DP 1.34. Our price **2 for £1.00**

**Z2470** HCPL2300 optocoupler by HP. Logic gate output. DP is astaggering 6.33 – **our price £2.00**

**Z2466** ILQ1 16 pin DIL device, probably quad opto isolator, but no info. **2 for £1.00**



**Lampholders** – rectangular snap in type that take LES bulb. Needs 16.1x11.6mm cut–out. DP (1978) 92p
**Z5193** Red **3/£1.00** 100+0.15
**Z5194** Green **3/£1.00** 100+ 0.15

**Z2385** 6V 5W SBC bulb. **Box of 10, £1.50**

**Z2459** Neon bulbs 5.5mm dia x 15mm long – wire ended 90V neons at a great saving over normal prices! Made by VCH International. **In packs of 100 at £4.00** 10+ 3.00

### Fibre Optic Cable

**Z8968** Fibretran development kit. A selection of sender and receiver units + ready terminated light guide assemblies and accessories + booklet. Originally sold for £150+. **Our price £50.00** (Full kit contents on request)

**Z5245** Fibre optic cable, multistrand sheathed, 2.28mm od, 0.095mm sq. Type A181. **Approx 5m length £4.00**

**Z2476** Similar to above, but 3.6mm od. **£2/metre**

**Z2477** Single strand 1mm dia. **Approx 5m length £2.00**

**Z2478** Single strand 0.2mm dia. Approx 10m (may not be in one length) **£2.00**

## SEMICONDUCTORS

### (a) Diodes

**Z2439** BZY88C36. 36V 400mW zener diodes. **Pack of 100 £2.00.** 1000 £10.00
**Z2465** Dual fast recovery diode BYW51–150A 150V 20A. TO220 case. DP 0.99. **Our price 2 for £1.00**
**K129** 8 AA113 diodes **£1.00**
**K197** 50 AA139 diodes preformed for horiz. mntg **£1.00**
**K237** 200 SD3 diodes, 2 joined back–to–back, preformed **£1.00**
**K242** 10 S2AR2 rects, 200V 1A **£1.00**
**K283** 100 1N922 silicon diodes preformed **£1.00**
**K285** 25 CV8790 signal diodes **£1.00**
**K286** 10 Germanium signal diode **£1.00**
**Z2454** MPS5010 1.2V voltage ref, 2 pin TO92. **3 for £1.00** 100+ 0.15

**Bridge Rectifier Clearance**

**Z2347** 4A 200V in line **6 for £1.** 100+.09 1k+.06

### (b) Transistors

**Z2383** 2N6027 P.U.T DP 49p, Our price **6 for £1.00** ;100+.08 1k+ .05

**Z2384** MPSA13 3OV Darlington TO92 transistor. Hfe 10,000 @ 0.1A DP 32p. **Pack of 8 for £1.00.** 100+ .06 1k+ .04

**Z2474** BUZ71 power mosfet TO220 case – 50V N–channel 14A 40W. DP 0.71. **Special low price – 3 for £1.00**

**Z2453** TIPL762 NPN 6A 120W 350V transistor. DP 4.02 **£2.00**

**K448** 12 MPSA92 **£1.00**
**K449** 20 BC258A **£1.00**
**K447** 10 BF419 **£1.00**

### (c) Voltage Regs

**Z2460** 78M12 500mA 12V voltage regulator at a super price – **6 for £1.00** 100+ 0.09 1k+ 0.06
**Z2455** 7805 riveted to small ally heatsink (unused) **5 for £1.00**
**Z950** LAS1510 voltage regulator. 10V 1.5A TO3 case. **2 for £1.00**

### (d) Digital IC's

**Z2452** 74HCT164 **4 for £1.00**

### (e) Linear IC's

**Z2456** CA3161E BCD–7 seg decoder driver, with pin out **£1.00**
**Z2457** CA3162E A–D converter, 3 digit display, with data. **£2.50**
**Z4160** TDA1035. Versatile audio amp chip, with IF amp and demodulator. Electronic volume control. Max output 4 watts into 8R. Supplied with cct and data. **Only £1.00**

## LOW COST SOUND CHIPS

A new range of sound effect chips is now being stocked. Supplied with typical circuit.
**UM34811A** Melody generator **£1.20** 100+ 0.75
**UM3562** 3 gun sound generator **75p** 100+ 0.38
**UM66** 3 Christmas carol medley **75p** 100+ 0.38

**Z2471** SN75372 interface chip **50p**

**Z2472** LF398N sample and hold amp. 8DIL DP 3.94 **Only £2.00**

**Z2473** OP27 low noise precision op amp. 8DIL. DP 1.70. **Only £1.00**

**Z722** TDA2653A vertical deflection chip. 13 lead SIL package, with comprehensive data **£1.00**

### (f) Crystals

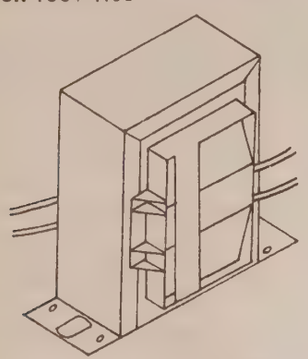
**Z2464** 8.000MHz crystal HC16 case **50p**

**Data sheets giving pin–outs and brief spec are available on all above items at 10p each**

## TRANSFORMERS

**Z5207** Torroidal transformer rated 75VA. Mains primary, 3 secondaries: 7V @ 7A, 8V @ 1.5A, 14V @ 1.5A. Useful voltages at a low price – **£4.50**

**Z5202** Torroidal transformer. This is the same series as our Z4290 type by Belclere – 75mm dia x 33mm thick. Fixing by means of a tapped bush. Mains primary, secondary 14–7.5–0–7.5–14V @ 1.25A **Excellent value at £2.95 each** 100+ 1.50



**Z5206** Super transformer for railway and other modellers. Mains primary, secondary 16V 3A. Size 50x55x60mm high. 61mm FC. Great value for money, **only £3.00** 100+2.00 1k+1.50

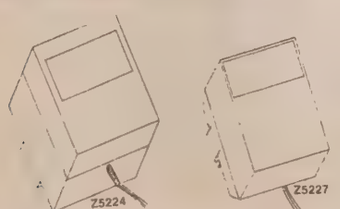
Some new mains transformers, ideally suited for PSU's:

| | | | | |
|---|---|---|---|---|
| **Z5212** | 21V | 1A | Clamp, | wires 60x45x50mm **£1.50** |
| **Z5213** | 14V | 1.5A | Tags | 60x44x50mm **£1.50** |
| **Z5214** | 11V | 0.5A | PC mntg | 53x40x4 4mm **£1.00** |
| **Z5215** | 15V | 0.25A | PC mntg | 43x33x3 6mm **75p** |

All the following are mains transformers, and have secondaries as shown. Current rating is estimated from size of transformer.

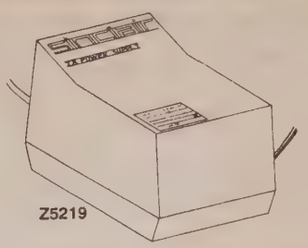
**Z5233** 17V 1A 56x67x53mm **£1.50**
**Z5234** 14V 0.5A 45x54x41mm **£1.00**
**Z5235** 9V + 10.5V 15VA max. 56x67x50mm **£2.00**
**Z5236** 21V 500mA 50x60x45mm **£1.50**

## PSU's




**Z5224** Jupiter Ace mains adaptor (there's a bit of history!) plug in type 240V, output 9V 800mA on 2m lead with 3.5mm plug. **£3.20**

**Z5227** Plug in 240V ac Beautronix power supply. Output 9V 333mA on 2m lead with 2.5 power socket. **£2.00**



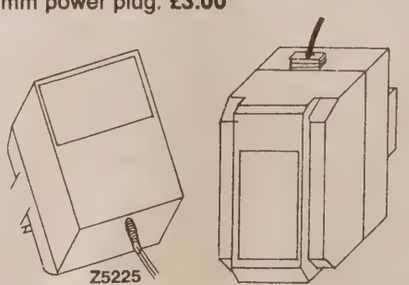

**Z5219** Sinclair ZX powers supply model UK700. 240V ac in, 9V 0.7A DC out. 2 core mains lead. 3.5mm jack lead output. **£2.50**

**Z5220** Sinclair ZX powers supply model Euro1200. 220V ac in, 9V 1.2A DC out. 2 core mains lead. 3.5mm jack lead output. **£3.00**

**Z5221** Sinclair ZX powers supply model Euro1400. 220V ac in, 9V 1.4A DC out. 2 core mains lead with 2 pin Euro plug. 2.1mm power socket lead output. **£3.50**

**Z5222** Psion Organiser power supply. Plug in type, 220/240V ac . Output 10.4V 175mA on 2m lead with 2.5 po wer plug **£2.00**

**Z5223** Psion printer power supply, input 220/240V ac via lead and 2 pin Euro plug. 10.4V 600mA DC output on 2m lead with 2.5mm power plug. **£3.00**




**Z5225** Universal mains adaptor, plug in type 240V ac. Output switchable 3–6–9V @ 300mA on end of short lead with 2 pin socket **£2.00**

**Z5226** Plug in 240V ac unlabelled power supply with short lead and 5 pin DIN socket. Outputs: 18V @ 250mA ac and 10V @ 500mA ac. **£3.00**

## SWITCH MODE PSU's

**Z5256** Switch mode PSU made by Tamura Corporation. Board 195x100mm with outputs on PCB pins. Input 120/240V ac; Outputs: +5V @ 7.5A; +12V @ 1.25A (2A peak); –12V @ 0.1A. **All this for just £12.95**

**Z5257** Switch mode PSU on PCB 190x78mm. 120/240V ac input. Outputs: +5V @ 3A; +12V @ 1.2A; –12V @ 0.1A. Made by Tamradio, Japan. **Only £7.95**

**Z5243** Part built PSU – this utilizes our panel Z5210 + transformer and extra parts required to build a smoothed stabilized supply with +5V (variable from 3–7V) at 2A and –5V @ 0.5A. **Excellent value at £3.50**

## SOUNDERS

**Z114** RHA101 re–entrant horn by STC. A 175x150x150mm unit that requires 12V at 0.6A to give a 110dBA continuous tone. White finish. Lots of noise for not much money! **£6.95**

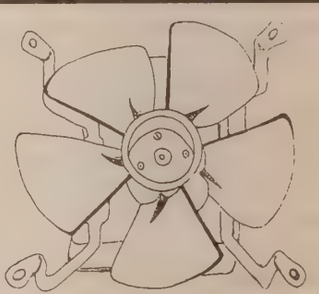
**Z671** ITT extn speaker unit. Neat case 135x105x55/35mm containing a 65mm speaker + 2 push buttons and 15m of 3 core flex. Individually boxed. **£3.00**

**Z2376** Sub–min buzzer 12 dia x 8mm high. PC mounting by Star QMB111P. **Only £1.00**

**Z2377** Star CMB 6V buzzer 22.5 x 15.8 x 14.4 mm. PCB mounting. High quality, low cost – **only £1.00**

**Z1771** Sounder QMB06 by Star. **3 for £1.00**

## MOTORS



**Z5171** Open construction mains fan. Five blade plastic blade 110mm dia (easily removable). Ex–equip in good condition, **£2.50.**

**Z5246** Mains synchronous motor with easily accessible gearbox giving a final speed to the 5.5mm dia 12 toothed gearwheel of 0.2RPM (12 revs per hour). **Only £3.95;** 100+ 2.50

**Z5201** Ingenious level indicator for LPG tanks. Magnetic strip attaches to exterior of tank and works by pouring hot water down gauge. Colour change will indicate level of gas left. 220mm long. Supplied on card with full instructions. **Only £1.00**

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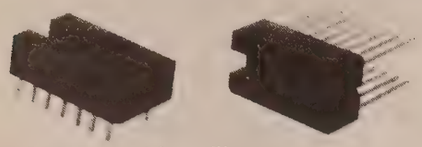
## CONNECTORS

Extra special price on gold plated DIL sockets – a parcel of Vero DIL sockets has arrived:



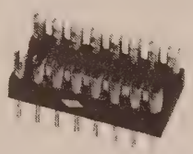
**(a) PCB mntg, std profile:**

**Z5237** 28 way **£1/10** 100+ .06
**Z5238** 40 way **£1.50/10** 100+ .08

**(b) Wirewrap**

**Z5239** 18 way **£3.80/10** 100+ 0.20
**Z5240** 20 way **£4.30/10** 100+ 0.25
**Z5241** 28 way **£7.00/10** 100+ 0.40
**Z5242** 40 way **£10.00/10** 100+ 0.65

**Z2360** Turned pin DIL socket – 24 pin, but 0.3" pitch not 0.6". **Pack of 5 for £1.** 100+ 0.10



**Z2380** 16 pin DIL solder header plug with cover by Jermyn. **Pack of 5 £1.00**

**P5430** 14 pin DIL header plug, gold plated solder type. As listed in our cat at 65p – special purchase price **3 for £1.00;** 100+ 0.16; 1k+ 0.12

**Z739** 40 way DIL header plug, gold plated. **3 for £1.00**

**Z2430** 40 pin IDC DIL plug, 0.6 pitch by 3M. **Pack of 2 £1.00;** 100+ 0.60

**P9016** 16 way IDC header socket. **Pack of 5 £1.00** ; 100+ .10

**Z2379** IDC 16 pin DIL socket. **Pack of 5 £1.00**

**Z2382** Double row 0.1 socket PCB/chassis mounting 16 way x 2, but only 1 row of pins. **Pack of 5 £1.00**

High quality 3.5mm mono jack plugs with coloured plastic sleeves made by Cliff:
**Z2457** Red **10/£1.00** 100+0.06
**Z2458** Green **10/£1.00** 100+ 0.06
**Z2479** White **10/£1.00** 100+ 0.06
**Z2480** Cream **10/£1.00** 100+ 0.06

**Z1485** RC4200-8S 8 way gold plated socket – matches McMurdo red range, but blue **£1.50**

**Z1768** Numicator/CRT base 13 pin PC mntg by Cinch. **Pack of 4 £1.00**

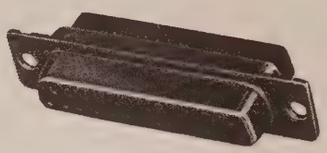
**Z042** 2 pin DIN speaker sockets, PC mntg. **Pack of 25 £1.20**

**Z2448** Phono plug. Black plastic cover. We have a large quantity of these to dispose of, so are clearing them at **25 for £1.00**, 100+ 0.03, 1000+ 0.02

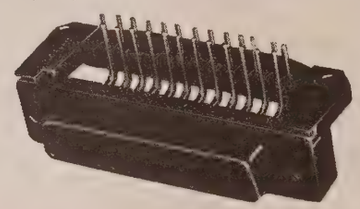
The 1992 GREENWELD Catalogue is out now! 132 pages of electronic and modellers supplies.

Only £2 (UK/ BFPO; £4 O'seas)

**ORDER NOW!**
See order form for details

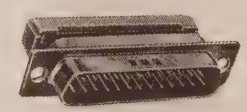


**Z2397** 25 way 'D' type shells. Can be used as either plugs or sockets, according to pins fitted. (No pins available) **Pack of 6 £1.00**

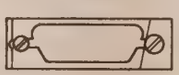


**Z2395** Right angle 50 way 'D' plug, PCB mounting, plastic housing. **£2.00**

**Z2396** Right angle 9 way 'D' socket. **40p**



**Z2430** 37 way 'D' type plug, IDC type **£2.00** 100+ 1.00



**Z2429** 15 way 'D' connector sliding lock retainer by ITT type DA51220-1 DP £3.45, **Only £1.00** 100+ 0.40

**Z2445** Data connector – like BT skt – 6 way PCB mntg for right hand plug. DP 1.74 **Our price 2 for £1.00,** 100+ 0.30

**Z2398** DIN 41612 IDC socket, C body, rows A and C only. List £6.65. **Our price £2.50**

**Z2399** 20 way card edge IDC socket. DP 2.47. **Our price £1.00**

**Z2426** 25 way double sided 0.1" pitch edge connector, gold plated, solder tags. **£1.00**

**Z2427** 50 way double sided 0.125" pitch edge connector, gold plated, wirewrap terminals. **£2.00**

**Z2428** PC mounting edge connector, 13 way double sided 0.15" pitch. Gold plated. **Pack of 2 £1.00** 100 + 0.25

## NEED A LEAD?

Here's a selection from a recent parcel:

**Z5247** 1.1m long twin thick flex, 2x3mm wander plugs one end, 3.5mm mono jack plug the other. Assorted colours. **Pack of 3 £1.00;** 100+ 0.18

**Z5248** 1.8m long twin flex, 3.5mm mono jack plug to open end. Fitted with sleeved square grommet. **Pack of 5 £1.00;** 100+ 0.10

**Z5249** 2m long twin flex, 2 pin socket to open end. Fitted with sleeved round grommet. **Pack of 5 £1.00;** 100+0.10

**Z5250** 1.1m long 3 core sheathed cable with odd socket one end, yellow 5mm LED in plastic housing the other. **Pack of 8 £1.00;** 100+ 0.06

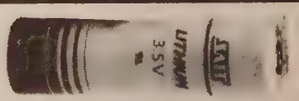
**Z5251** 1m long twin flex, 2.5mm power socket to open end. Fitted with sleeved square grommet. **Pack of 3 £1.00;** 100+0.18

**Z5252** Super ***heavy duty extra long*** (2.7m) twin sheathed cable with moulded on 2.5mm power socket to open end. **2 for £1.00;** 100+0.25

**Z5254** 2m long 4 core sheathed cable fitted with a sleeved grommet. 4 pin DIN socket to open end. **4 for £1.00;** 100+ 0.12

**Z5255** 2m long 2 core black sheathed mains cable (3A). Moulded 2 pin Euro plug one end, 0.25 tags the other. **3 for £1.00;** 100+ 0.18

## BATTERIES

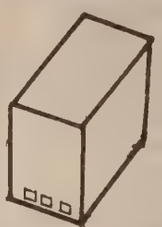



**Z2452** Lithium battery – inorganic type by Tadiran, type TL5104. AA size, 3.6V PC tabs. Date code 06/88 **£1.70**

**Z2453** As above, but type SL360, date code 4/87. **£1.50**

**Z2450** Tadiran AA size battery 3.6V PC mounting. Date code 6/89. DP on these is 5.17. Our price **£2.00** 25+ 1.50 100+ 1.20

**Z2451** Tadiran 0.5AA size battery, 3.6V PC mntg. Date code 8/86. DP 4.58 Our price **£1.75** 25+ 1.35 100+ 1.05



**Z4150** AA Ni-cads at a price never before seen! Pack of 8 in a tough plastic case 56x63x33mm – either use as a 10V battery pack or remove and use cells individually. Special low price **£1.60 each**; 25+ 1.10 100+ 0.80

# RELAYS

| Code | Mnf'r | Type | Coil V | Coil R | Contacts | | Base | Type | Size l.w.h | Qty | Pic | Price |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Z2423 | VARLEY | VP4 | 48V | 5800R | 4PCO | 1A | ST | C | 29.18.29 | 93 | A | 1.00 |
| Z2414 | SIEMENS | V23154 | 12V | 800R | 4PCO | 1A | PC | C | 29.18.29 | 96 | A | 2.00 |
| Z2421 | ITT | A2825 | 24V | 1000R | 6PCO | 1A | PC | C | 33.30.29 | 57 | B | 1.00 |
| Z2424 | ITT | A2446 | 48V | 3000R | DPCO | 1A | PC | C | 29.16.13 | 59 | C | 1.00 |
| Z2425 | FEME | RCP11 | 110V | 10K | 3PCO | 10A | 11PIN | C | 35.35.56 | 84 | D | 2.00 |
| Z2420 | AMF | KUP14D | 24V | 450R | 3PCO | 10A | ST | C | 37.34.51 | 82 | E | 2.00 |
| Z2419 | NATIONAL | AE1324 | 24V | 2000R | DPCO | 1A | PC | C | 30.20.10 | 218 | F | 1.00 |
| Z2413* | AX | 481F | 12V | 1500R | SPCO | 1A | PC | M | 32.10.10 | 538 | G | 1.00 |
| Z2408* | CLARE | HGR2M | 5V | 500R | DPCO | 1A | PC | M | 40.25.10 | 117 | H | 1.00 |
| Z2418 | OUB | SS124D | 24V | 1200R | SPCO | 5A | PC | C | 21.17.15 | 118 | I | 1.00 |
| Z2412 | OUB | SS-212D | 12V | 300R | DPCO | 2A | PC | C | 18.10.12 | 29 | J | 1.00 |
| Z2417 | OUB | SS-224D | 24V | 1200R | DPCO | 2A | PC | C | 18.10.12 | 196 | J | 1.00 |
| Z2422 | | AZ1530-04Y | 36V | 4300R | SPCO | 2A | PC | C | 26.14.11 | 648 | K | 1.00 |
| Z2400* | GENTECH | G42F | 3V | 130R | SPB | 1A | PC | M | 33.16.11 | 127 | L | 1.00 |
| Z2416 | HAMLIN | HE221A4860 | 24V | 11K | SPM | 1A | PC | R | 32.10.09 | 799 | M | 1.00 |
| Z2411 | HAMLIN | HE221A7080 | 12V | 800R | SPM | 1A | PC | R | 32.10.09 | 1501 | M | 1.00 |
| Z2407 | HAMLIN | HE262A7780 | 5V | 470R | DPM | 1A | PC | R | 32.12.09 | 135 | N | 1.00 |
| Z2406* | ELLIOTT | 36876/5 | 5V | 130R | SPB | 1A | PC | R | 32.15.10 | 345 | O | 1.00 |
| Z2410 | ALMA | CPR3 | 12V | 1100R | 3PM | 1A | PC | R | 38.23.12 | 38 | P | 1.00 |
| Z2405* | CLARE | PRME15005AB | 5V | 470R | SPM | 500MA | DIL | R | 20.07.05 | 354 | Q | 1.00 |
| Z2404* | HAMLIN | HE721A5262 | 5V | 520R | SPM | 500MA | DIL | R | 20.07.07 | 51 | Q | 1.00 |
| Z2415 | AX | 132A-1 | 12V | 180R | SPM | 500MA | DIL | R | 20.07.07 | 31 | Q | 1.00 |
| Z2403* | AX | 132A-4 | 5V | 520R | SPM | 500MA | DIL | R | 20.07.07 | 65 | Q | 1.00 |
| Z2402* | CLARE | CUPV10201 | 5V | 170R | SPB | 1A | PC | R | 25.10.9.5 | 50 | N | 1.00 |
| Z2409* | CLARE | CUPV10302 | 12V | 370R | SPB/SPM | 1A | PC | R | 31.12.04 | 27 | O | 1.00 |
| Z2401* | AX | 175A-4 | 5V | 500R | SPM | 1A | PC | R | 32.15.9.5 | 47 | R | 1.00 |

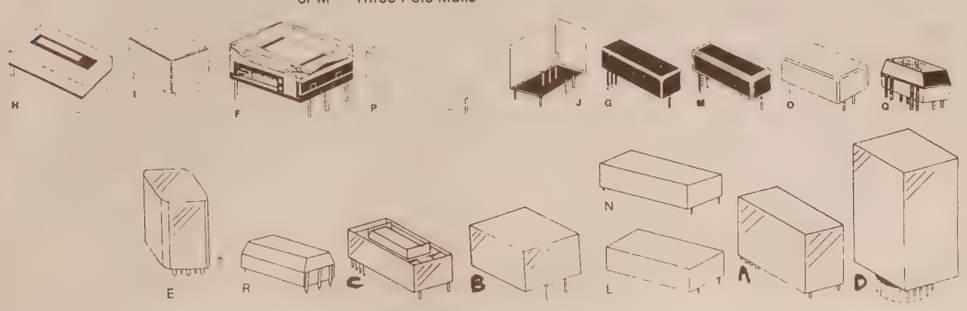
Discounts for larger purchases: 100+ (any mix) less 40% 1000+ less 60%

Type: C= conventional
M= mercury
R= reed

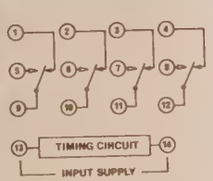
*Internal diode protection

Contacts: 4PCO Four Pole Changeover
DPCO Double Pole Changeover
SPCO Single Pole Changeover
SPM Single Pole Make
SPB Single Pole Break
3PM Three Pole Make

Base: ST Solder Tags
PC PCB mntg
DIL 0.3" pitch dual in line



## TIME DELAY RELAYS




These all originate from the largest component distributor in the UK and are in original packing. Sub min 4 pole changeover plug in type, delay before energize. Same as Omron H3Y4 series

| Code | Volts | Time | DP | Price |
|---|---|---|---|---|
| **Z5186** | 240V ac | 5s | 25.83 | **£5.00** |
| **Z5198** | 240V ac | 10s | 25.83 | **£5.00** |
| **Z5199** | 240V ac | 10m | 25.83 | **£5.00** |
| **Z5183** | 110V ac | 5s | 25.83 | **£4.00** |
| **Z5184** | 110V ac | 10s | 25.83 | **£4.00** |
| **Z5185** | 110V ac | 60s | 25.83 | **£4.00** |
| **Z5186** | 110V ac | 5m | 25.83 | **£4.00** |
| **Z5187** | 24V DC | 5s | 24.19 | **£5.00** |
| **Z5188** | 24V DC | 10s | 24.19 | **£5.00** |
| **Z5189** | 24V DC | 60s | 24.19 | **£5.00** |
| **Z5190** | 24V DC | 5m | 24.19 | **£5.00** |

**Z2350**. Open construction 12V relay with 0.25 tabs. Ideal for car use. Single pole make contact rated 15A. **£1**

**Z2389** 11 pin screw terminal relay base DP £3.60, **our price £1.50**

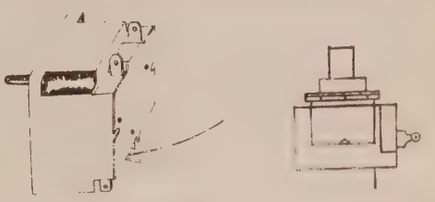
**Z5178** Ex-equip PCB mntg 12V heavy duty rela – DPCO contacts rated 10A 250V. IMO model 60.42. **£1,50**

**Z5179** As above but 3 pole changeover IMO 60.43. **£2.00**

**Z2442** PCB mounting relay 30x24x10mm. 4PCO. 1150R coil, operates from 15-30V. **£1.50**

**Z2433** Hermetically sealed mains relay, miniature plug in type with 4PCO contacts. Size 22,5x29x32mm. DP (1987) 17.75. **Our special low price £4.75**

## SWITCHES



**Z5174** Timer switch by Diehl of Germany. Superb geared mains motor, (1 rev per 12 hours) operates a cam that switches 2 change over contacts with centre – off positions rated 16A 250V. Size 60x54x43mm. Spindle is 14x6mm dia. **Only £3.00** 100+ £1.50.

**Z2361** Heavy duty push switch – push to change over, locking. Needs 12mm hole. Plunger is 8mm dia x 9mm high, **3 for £1.00**

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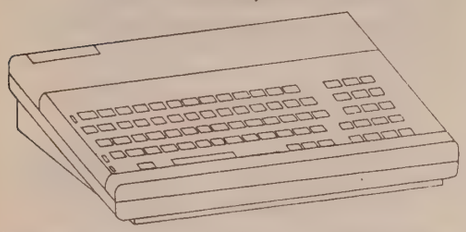
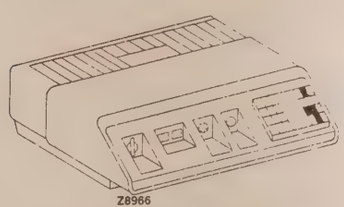
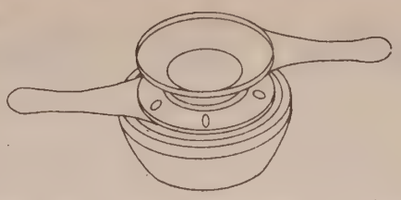


Tandata TD1100 alphanumeric Viewdata/Prestel Adaptor.
These units were used with a home banking system. The console was hooked up to your TV and telephone line, and by using the standard qwerty keyboard with seperate numeric keypad, you could access your account. The well styled black and grey case 300x180x75/40 has a 75 key keyboard connected inside by a DIL plug to the main PCB. This has mounted on it the modem sub-panel + 3 relays, UM1286 Astec colour modulator with sound, + SAA5020, 5050, 5070, SY6504, 68B10, MCM51101P45, 2x2114 & 2732 EPROM all in sockets, as well as over 20 other LS and linear chips, transistors etc. There's a back up nicad battery and a regulated power supply. On the rear panel is an on/off rocker switch, UHF output socket, printer skt(15 way D), and cassette DIN socket for recording data.
There are 3 leads attached; 4m long mains lead with 13A plug, 4m long BT lead with old-style plug, and a 3m long TV co-ax lead.
All in all, a versatile, useful compact unit either to use as it is or for the parts within. The component value alone is over £60, so you can see what a bargain this is - it even comes with a photocopied handbook!!
**Order Code Z8963.** The whole unit as described for just **£12.95**
Also available brand new and boxed, **Z8964 £16.95**

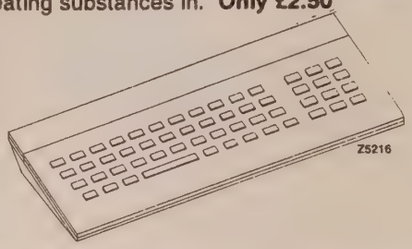


Z8966

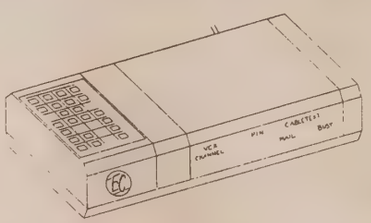
**Z8966** Prestel set less monitor. This cased unit 420x430x100mm made by Phillips, model HU01 contains all the logic and control circuitry for Prestel - the monitor (not supplied) sits on top. On the back panel there is an 8 pin DIN socket for text output to monitor, mains outlet to monitor and an 8 pin DIN printer socket. There's also a mains lead and old type lead to telephone socket. On the front panel there is a detachable (on curly lead) keypad (20 keys) on/off keyswitch, tape and keyboard sockets and indicator lamps. Inside there's a large transformer and power supply and 4 PCB's - one is a modem panel; one has 8048 and SBB2626 in sockets + 15 other chips, transistors etc; the third has SAA5030/5042/5020/5050, a bit of memory (2x2114) + a few other chips. The fourth panel has SAA5010 in socket, 9xBSX20, 4xBC548/558. All boards are interconnected with plugs and sockets. These units are complete but not new and may well be in working order - but we're selling them for the parts value only - just **£16.00**



**Z5200** Spirit Burner. Very useful in science labs or for the home experimenter. Chromed steel container 93mm diax48mm high has absorbent material covered in wire mesh. Adjusting lever allows variations in temperature. Complete with 70mm dia dish for heating substances in. **Only £2.50**

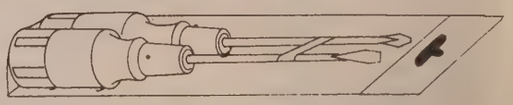



**Z5216** Tandata "Homedeck". These are later versions of Z8963 and are (a) smaller and (b) remote controlled. The two tone grey case is 270x110x28mm and has a full qwerty keyboard and seperate numeric keypad. Inside, on the PCB are a few components to transmit the data via 2 IR LED's to the receiver. The unit is powered by a PP3 battery. Super value at just **£3.00**



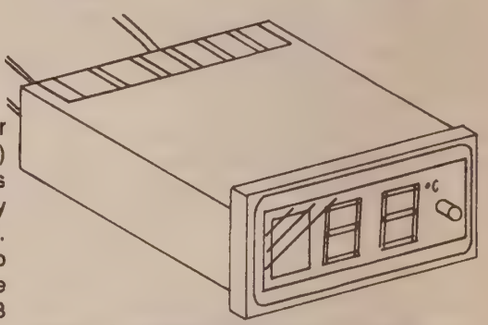
**Z8970** Remote control cable TV unit made by GEC. Attractive black plastic case 205x120x40mm with membrane pushbutton keypad (22 keys). Front panel has 4x5mm red LED's to indicate status and a dual 7 seg display to show channel. On the 195x102mm PCB is a small regulated power supply (12V & 5V) derived from **Z5226** plug in PSU (not supplied). The main chip is a KS49429 and there are also TBA120T, ULN2003B, 4049 + 4.000MHz crystal & 3 small signal transistors as well as the IR detector diode. 2 screened cases contain (a) a PCB with some filter circuitry utilizing surface mount technology, few small chokes, couple of trimmer caps and input and output sockets; and (b) the infra red decoding circuitry using a TDA3047 chip. Regrettaby, we don't have any remote controllers, but these units offer great value for money - **just £5.95 each**

## MONSTER SCREWDRIVER BARGAIN !!!



Tremendous value - 2x200mm screwdrivers, 1 pozi, 1 straight blade in plastic pouch. Wooden handles. Overall length 340mm. **ONLY £1.50.** Order code **Z5172**

A nice parcel of digital thermostats has just been delivered - these are high quality units badged BIRCH and manufactured by Wrynech.



**Z5228** Complete unit in panel mounting clip-fix case (requires 60x27mm cut out). 2 digit display. Range 40-99°C. Independant on/off set points. Uses LM35CZ sensor, supplied on a 3m long lead (DP 5.93). Has 5V relay on board with 240V 8A c/o contact. Exceptional value for money **£14.95**

**Z5229** Case for above unit with red bezel and front clip. Overall dimensions 57.5x25x70mm deep. **Only £1.50 each** 100+ 0.80

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During our holiday in Friedrichshafen, we will be staying for four nights in what is considered to be the best Hotel in town - The Buchorner Hof Hotel. Roger Hall G4TNT, has examined the Hotel Bar (very closely!), the rooms, and eaten in the restaurant, and he says it's certainly very luxurious.

The only minor problem is that most of the rooms are doubles. In this case, they really mean rooms with double-beds, not twin-bedded rooms! This means that this trip is more suitable for couples, and so we can encourage more husband and wives or girlfriends to come, we have organised a couple of day excursions for the Friday and Saturday. One trip is to the beautiful Island of Mainau, famous for its flowers and topiary, and the other is into the heart of the Black Forest, the home of the cuckoo-clock. Both trips will provide delightful days out.

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# A Simple Capacitor Checker

Construction

*Even if you're only an occasional home-brewer, a basic capacitor checker is a most useful piece of equipment to have in the shack. John Cushing G3KHC, describes this simple project which can help you check all those 'bargain' components.*

If you ever do any constructional work, even if it's only to build the occasional kit once in a while, it is always a good policy to make some checks on the components. You may ask why this is necessary, but although a bit of time is needed in building the unit, it avoids building faulty components into a project. Even if the project you're building doesn't work well, at least you'll know that the capacitors will be okay!

## Easiest Items

The easiest items to check in a circuit are the resistors and capacitors. To check resistors, the Ohm's range on a bench-type multimeter is usually good enough, at least for commonly used values.

Testing capacitors is however, not quite as easy, but the circuit I've come up with provides an easily-built project. It's accurate enough for most jobs and with today's high prices in mind, can be built for a very low cost.

## The Circuit

The circuit, **Fig. 1**, has few components. It uses an i.c., six capacitors, a similar number of resistors (most of these are variable types) two diodes and a moving-coil meter.

As we all know, meter movements don't come cheap and if your funds are low, a multimeter can be used instead, provided it can be switched to a full-scale reading of one or two milliamps.

The manner in which the circuit works isn't difficult to understand. A capacitor will not pass direct current, but on the other hand an alternating current will flow 'through' a capacitor, and a fairly simple rule-of-thumb exists.

If the value of a capacitor is fixed, the current passing through it depends on the frequency involved. The rule is that if the frequency is raised, the flow of current is increased too.

This effect works in the opposite direction too, in that providing the frequency remains the same, the greater the value of the capacitor, the more the current will flow.

## Integrated Circuit

Now it's time to turn to the main circuit, **Fig. 1**, which is based on a 4011 i.c. Two gates, IC1a and IC1b, are used to form a simple oscillator.

One of five fixed frequencies is used, and they are selected by S1a and 1b. The square-wave that's produced (we'll consider it as being a.c. for this application) is taken through a third gate, IC1c, which functions as a buffer. This form of oscillator can be classed as a 'sure fire' type, and no trouble is likely to be found.

From pin 10 of the 4011, the square-wave is passed through the 'unknown' (the component to be tested) capacitor. Two diodes, D1 and 2, serve to rectify the square-wave to produce enough current to deflect the 1mA full scale deflection (f.s.d.) meter.

## Stabilised Supply

When I built the prototype unit in the usual 'lash-up' form, it was powered from a stabilised power supply unit with a variable output. I soon noticed that even if the voltage was changed by even a fraction of a volt, the reading on the meter also altered.

Because of this, I thoroughly recommend that the unit be powered from a fixed voltage, stabilised supply. (**Note:** the author recommends that a 10V stabilised supply be used, but on our prototype we found that a fixed, 9V stabilised supply was adequate, provided this was to be the normal level. The important point to remember with this project, is that once the tester has been set-up at chosen working voltage, you must keep to that voltage, if you are to obtain meaningful results. **Editor**).

## Assembling The Project

When you're ready to begin assembling the project, I suggest the following approach, as it will save you a lot of time and bother.

It's good policy if C1, 2 and 3 are 1% tolerance types (silver mica types). Others, such as C4 and 5 can be 5%, or failing that, even 10%.

You'll also need the same value capacitors, excepting the 10pF, but including a 1µF. These capacitors will be used in the final setting-up of the tester.

The pre-set variable resistors can be of any type that you've got handy. However, you will find that the larger types are easier to adjust than the smaller versions.

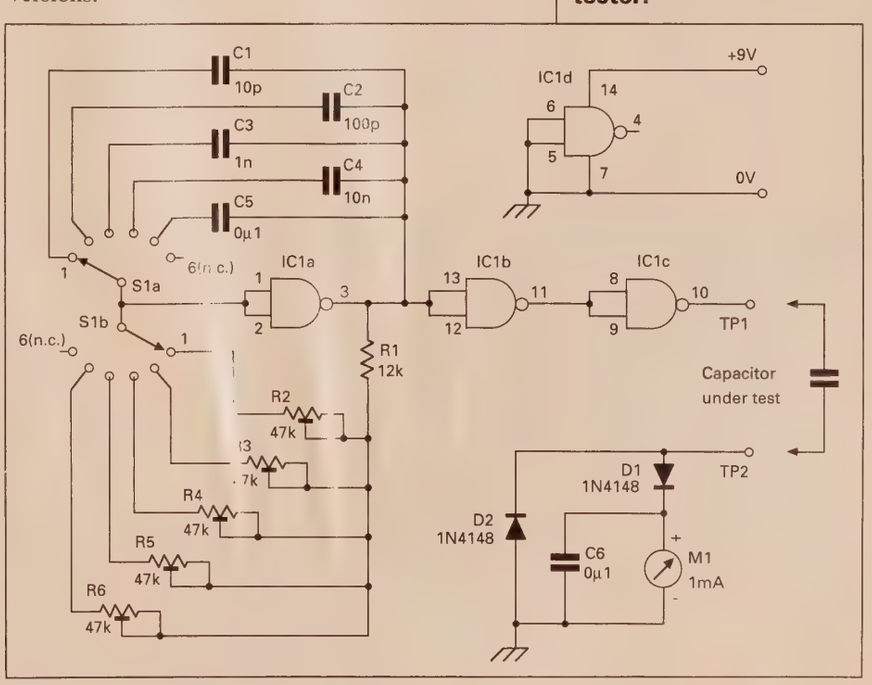


**Fig. 1: Circuit of the simple capacitor tester.**

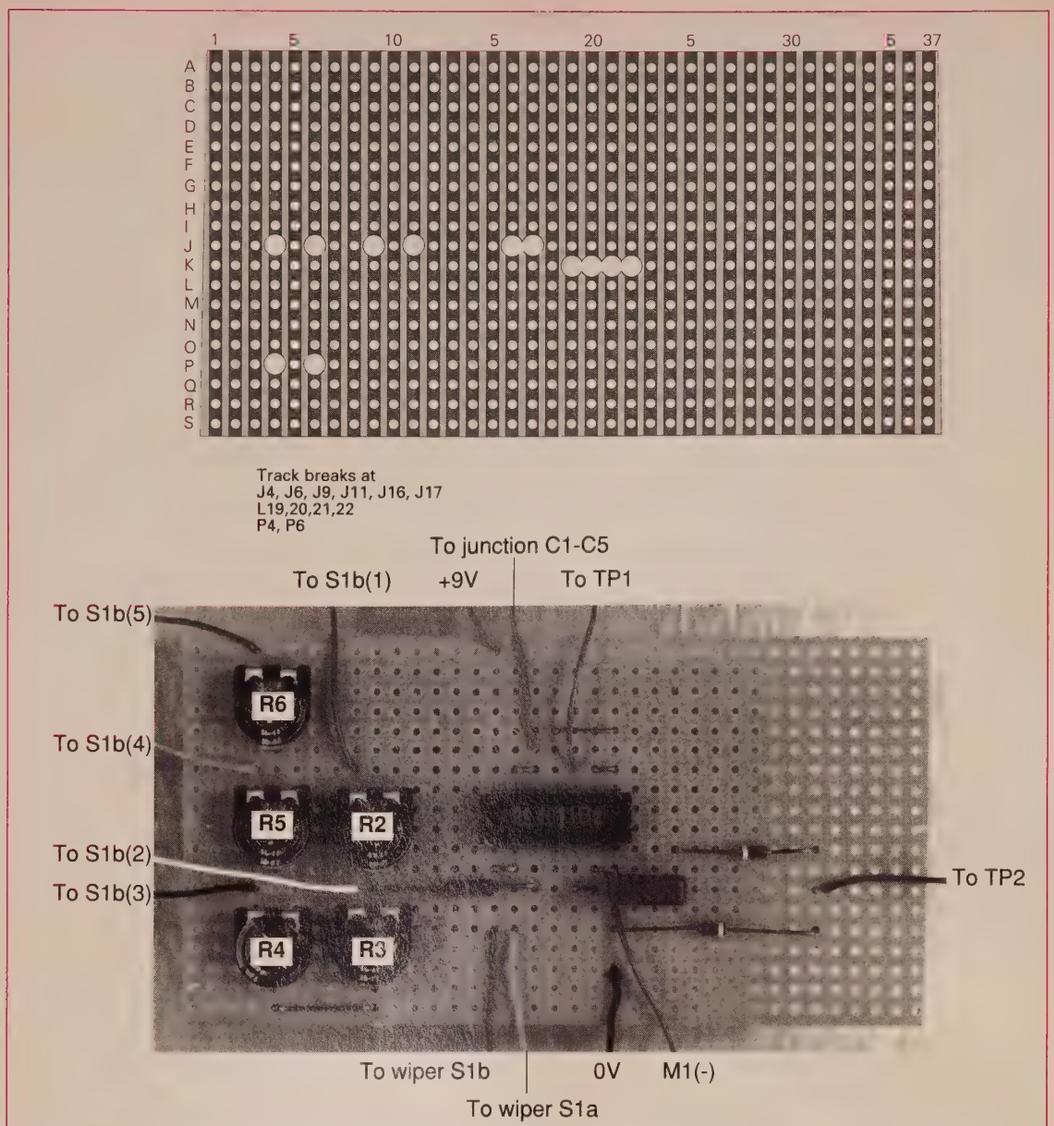


**Fig. 2: After making the cuts in the tracks, as shown above, turn the board over, so that Row A comes to the bottom of the photograph in the overlay.**

A pair of terminals will be needed to allow connection of the unknown capacitors. What you use, depends on what's to hand, but quick-and-easy connections are required. (**Editorial note**: The *PW* prototype employed small crocodile clips as shown in the photograph).

## The Meter

The meter should be a 1mA f.s.d. type, as I've mentioned already. In the long run, I think that it's best if you obtain a larger movement, rather than a smaller unit, as this will be far easier to read.

However, as moving coil meters are relatively expensive, your bench test meter can be pressed into service. The only constraint in using a bench meter, is that it must be able to read either 1 or 2mA f.s.d.

## Veroboard Layout

Although I used a Veroboard layout, the project can be built literally in any way you like. For me, Veroboard provides a way of getting on with the job quickly, and this is the way I tackled the job.

Some of you may prefer to make a p.c.b. design, and there shouldn't be any problem with this method. I will make the point that, if you're fairly new to constructional work, you'll learn more from 'rolling your own' than from blindly copying someone else's work.

**Capacitors C1-C5 are mounted on the body of S1 as shown here.**

## A Few Tips

To help you, I've got a few tips and hints to pass on. To start off, two 'ways' (5 and 6) of S1a and S1b can be wired together, as a five-way, rather than a six-way is needed, although you have to buy a six-way type!

Any wiring associated with C5 and 4, running to the switch, is best kept rigid. It should also be kept away from other wiring as much as is practical in your chosen layout.

Similarly, the wiring leading to the terminals for testing Cx (the unknown capacitor) should also be rigid and arranged so they are apart from other wiring. The un-used section of IC1, should be arranged, as shown in the supplementary circuit (top right) of the main circuit diagram, **Fig. 1**. This is done, so that the gates are not left 'floating', to avoid any problems.

## Setting Up

When you've finished the building, there remains the job of setting-up the unit. To start the setting-up, set S1 so that C5 is in circuit, and then place a 1µF capacitor across the capacitor test terminals.

Switch on, and set the variable resistor, R6, so that the meter reads f.s.d. Next, you should try capacitors of less than 1µF across the capacitor test terminals, noting the reading on the meter as you do so.

Don't worry for the moment, if the meter doesn't indicate exactly what you expect. This may happen because you may be using components with a tolerance of 10% or even 20%. It may also be that all the errors add to each other, producing an odd reading.

This problem can be avoided if you can get the use of a good quality capacitance and resistance bridge. With the help of the bridge, you can measure some capacitors and pick some with close values.

Next, you should switch to use C4, and place a 0.1µF across the test terminals and set the variable resistor, R5, to give a f.s.d. on the meter. To further test the unit, you can place any odd capacitors across the test terminals, and compare the results with known, good, components.

You can now complete the setting-up procedure by selecting C3 in conjunction with R4, with a 0.01µf across the test terminals. Next it's C2 in conjunction with R3, with a 1000pF across the test terminals. The setting-up finishes with the selection of C1 and the adjustment of R2 with a 100pF capacitor across the test terminals.

## Boxed Up

The finished project can now be boxed up in any way that's convenient. Using the capacitor checker is easy enough, it's just a matter of placing a capacitor across the test terminals, switching the power supply on, and changing the setting of S1 if necessary.

There's a possible objection to this method, as you may find the meter needle trying to wrap itself around the end stop! Meters don't like this treatment, so I suggest you use the following method.

Set S1, so that C5 (the 0.1µF capacitor) is in circuit. Make a reading, by switching on your power supply as before. Then you can switch through the ranges provided by C4, 3, 2, or 1 as necessary.

The last part of the construction is to make a scale to suit a pointer knob attached to S1. The scale should be marked 1µF, 0.1µF, 0.01µF, 1000pF and 100pF.(**Note:** The *PW* prototype's switch, shown in the photograph, is not marked in this way and has a range number instead, **Editor**).

## *All Finished*

*When the project is all finished, you can go through your junk box and use up those capacitors, especially all those with indistinct markings! You'll find it's a handy little unit which allows fast checking of capacitors. It does not have a high degree of accuracy, but with a little care, 5% should be obtainable, and this is good enough for many applications.*

**How Much ?** **£10 (less if you have a suitable meter)**
**How Difficult?** **Intermediate**

## Shopping List

**Resistors**
Carbon film 5% 0.25W
12kΩ 1 R1
Resistors variable (see text)
47kΩ 5 R2, 3, 4, 5, 6.

**Capacitors**
Silver mica (see text reference tolerances) except where otherwise stated.
10pF
100pF 1 C1
1nF 1 C2
10nF 1 C3
0.1µF 1 C4
0.1µF 1 C5 Mylar or disc ceramic type
1 C6 Mylar or disc ceramic type

**Integrated Circuit**
4011 1 IC1 (see text)

**Semiconductors**
1N4148 2 D1, 2 (see text)

**Miscellaneous**
Vero board, matrix board, or p.c.b. material to suit your construction style used, crocodile clips or terminals, 2-pole 6-way rotary switch, i.c. socket, suitable moving coil meter (see text for suggestions on how to use your bench meter), suitable box, label for switch positions, connecting wire.


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| 2.0 TO 4.0MHz | £6.00 | 3rd OVT 60.00 TO 75MHz | £5.50 |
| 4.0 TO 6.0MHz | £5.50 | 5th OVT 60 to 110MHz | £6.00 |
| 6 TO 22MHz | £5.35 | 5th OVT 101.00 TO 126MHz | £8.75 |
| 22 TO 26MHz | £7.65 | 7th OVT 125.00 TO 175MHz | £12.00 |
| DELIVERY: Approx. 2 weeks | | 9th OVT 170.00 TO 225MHz | £12.20 |

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# Mathematics For The RAE



*This month Ray Fautley G3ASG carries on with the subject of Ohm's Law. On the way he explains what happens to circuit currents when resistances are combined in parallel.*

### Misprint Error

A misprint appeared in the January 1992 issue of the column. On page 52 of that issue, about two thirds of the way down the left hand column was the formula;

$$\frac{1}{R(C-D)} = \frac{1}{100} + \frac{1}{270}$$

Then below that, under a paragraph that began "Use a calculator to convert the fractions....", was the working out. In this line, the first figure was wrong. The value '0.001' (one thousandth) should have been '0.01' (one hundredth). The answer was correctly shown as 0.0137, but this line should read:

$$\frac{1}{Rtotal} = 0.01 + 0.0037 = 0.0137$$

Our thanks go to all those eagle-eyed people (and over the holiday too!) who found and told us of the error, especially our many young mathematicians. **(Our apologies for not spotting the misprint. Editor).**

Before getting down to this month's business, how did you get on with the problems in the last issue? The problems weren't that bad now, were they?

From last month you'll remember that with **resistors in series, the voltage is shared** (between the resistors), but the current is the same (as there is only one way through the circuit). But when **resistors are in parallel the current is shared** instead (and the voltage is the same for all parallel resistors).

### Resistors In Parallel

Let's look at the diagram of **Fig. 1**. Here you can see that the resistors R1 and R2 are in parallel (side by side). You will see that at point A, the total current ($I_t$) has a choice of paths. Some of this current will flow through R1 ($I_{R1}$), and what is left will flow down through R2 ($I_{R2}$). At point B of course these partial currents ($I_{R1}$ and $I_{R2}$) recombine to form the total current ($I_t$) again. Mathematically we can say that $I_t = I_{R1}+I_{R2}$ (the total current, is the addition all of the partial currents).

But how do we find out how much goes down each leg? and how to work these currents out. You might like to refer back to Ohm's law triangle on page 43 of the February '92 issue.

The easy part is that the voltage is the voltage across both resistors. From the triangle;

$$IR1 = \frac{V}{R1} \text{ and similarly } IR2 = \frac{V}{R2}$$

From these two simple equations, we can work out the numerical relationship of $I_{R1}$ to $I_{R2}$. The voltage V appears on top of both equations, so we can ignore it, or replace it with the value 1 for this relationship. This relationship is the reciprocal of their respective resistance values, and is independent of the total current flowing in the circuit. But more of this later.

### Practical Figures

As we normally do, let's put in a few simple figures to make it easier. Let's assume that R1 is 1kΩ and R2 is 2kΩ. If V is 10V then $I_{R1}$ is 10mA ($^{10V}/_{1k\Omega}$), and $I_{R2}$ is 5mA($^{10V}/_{2k\Omega}$).

Notice that $I_{R2}$ is **half** of $I_{R1}$, and R2 is **twice** the value of R1. Just for confirmation of this relationship, let's look at the value of current if R2 were to be 5kΩ.

From the Ohm's law triangle again, $I=^{V}/_{R}$ ($^{10V}/_{5k\Omega}$) = 2mA. This fits in well with the rule, as **five** times the resistance gives **one fifth** of the current

### Practical Ammeter

The current sharing effect of resistors in parallel is used to great effect in instruments, which can be capable of measuring currents of up to several hundred amperes. We will content ourselves with a more modest level.

Let's assume we want to measure a current ($I_t$) of 1mA, but only have a meter with an f.s.d. of 50μA. Let's also assume that the internal resistance ($R_{int}$) of the meter is 5kΩ.

Look at the diagram of **Fig. 2**, this is the circuit of our simple current meter. It consists of the microammeter and a parallel resistor, $R_s$, that 'shunts' the major part of the current away from the meter. It is the total current of 1mA, which we want to measure. This must be split into two parts, $I_m$ 50μA (maximum through the meter), and 950μA ($I_s$) through $R_s$.

The voltage, V, (across the meter and $R_s$) is 0.25V (I*R). So if $I_s$ is 950μA, what value must $R_s$ have to give this value of p.d.? In doing the calculation I have rounded the answer obtained to two significant figures.

$$Rshunt = \frac{0.25V}{950\mu A} = 263.16$$

### Easier Method

There is an easier method of calculating $R_s$, and it depends on the relationship of the currents and resistances that we discovered above. The bypass current $I_s$ is 19 times greater than the meter f.s.d. We can use this fact to calculate $R_s$ almost directly. This is easier than having to find the voltage across the meter first.

If $I_s$ is 19 time **greater** than the meter current, then the $R_s$ must be 19 times **smaller** than $R_{int}$. Let's put that in figures to make it easier.

Divide 5kΩ ($R_{int}$) by 19 and the answer is 263.16Ω. This is the same value that we calculated above, by the longer method.

*Continued on page 47*

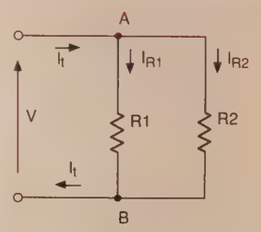


**Fig. 1.**

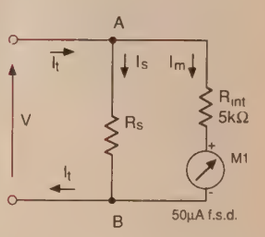


**Fig. 2.**

**Fig. 1: Resistors R1 and R2 are in parallel, the total current flowing is shared between them.**

**Fig. 2: Theoretical circuit of an ammeter. See text for an explanation.**

# CB HIGH & LOW

By 'Quaynotes'

***This month, 'Quaynotes' takes an in-depth look at the Midland 77-104 27MHz CB transceiver.***

The very compact Midland 77-104 27MHz transceiver, caters for the 40 channels (MPT1320) CB band. It's an ideal size for mobile operation, especially if space in the car is limited, as it measures only 170 x 115 x 30mm.

For mobile installation, the transceiver, **Fig. 1**, is supplied with a mounting cradle. It can be removed from this in a jiffy, and as it's so small, it can be put in your pocket when you leave the car. If someone 'nicks' the car...you'll still have your CB rig!

### Clear Terms

The instruction booklet for the 77-104 tells you in clear terms, backed up with plenty of useful illustrations, all you need to know about installing and operating the equipment. It also includes notes on ignition and other electrical noise suppression techniques.

The booklet also covers the various factors that can effect the 27MHz band's working range. Simple fault-finding is also covered, and the book provides useful information on UK channels, etc.

### Base Station

The Midland 77-104 can of course be used for base station operation, using an external 13.8V d.c. power supply. The Nevada CTE HQ30 will do this job for you, or the rig will work quite adequately on a 12V car battery supply.

Nominal radio frequency (r.f.) output power of this rig is 4W, transmitting with frequency modulation (f.m.) on 40 channels within the frequency band 27.60125 to 27.99125MHz.

Essential items supplied with the rig are a twin lead, in-lined fused d.c. supply cable, and a hand-held microphone with a press-to-talk (p.t.t.) switch.

Antenna connection and entry is on the rear of the unit, via a PL230 socket. There is also provision, via a switch, on the rear for reducing power by 10dB (an effective reduction of 10 times). Reception by the way, is not effected by this facility.

### Panel Controls

Channel selection is by front panel controls. If you continuously rotate the main channel selection knob, you'll eventually get up to 40, and then pass on to 1 again, without having to reverse the control.

The channel in use is well indicated by large green (and bright) l.e.d. (light emitting diode) figures. Immediately below the channel indicator, is a row of four 'bar' type red l.e.d.s that light up according to the strength of a received signal. In other words, all four red l.e.d.s light up for a S-9+ signal, and pro-rata for lower signal levels.

During transmission all the l.e.d.s light up when the normal 4W of r.f. output power is used, and the s.w.r. (standing wave ratio) is down to an acceptable level.

The audio volume and squelch controls, next to the DIN socket for the microphone, are of the dual shaft type, as commonly found in hi-fi amplifier use. The inner knob operates the on-off switch and controls the audio volume, and the outer knob adjusts the squelch level.

**Fig. 1: You can judge the size of the set from its normal size microphone**

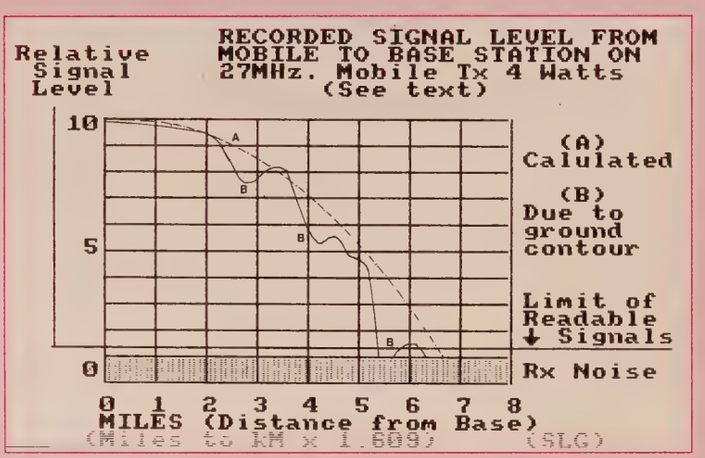


**Fig. 2.**

### On Air Tests

The 77-104 was tested on air first for base station operation. For this part of the test, I used a centre-loaded antenna approximately 4m high.

The countryside around my house is fairly flat for approximately 16km or so. Contacts were made with other fixed stations at distances up to 14km, with received signals being well above the ambient noise and lighting at least one l.e.d.

Numerous mobiles were worked, with readable signals both ways over distances of 8km or so, depending on the ground contours. Of course, these distances would have been considerably increased if the base test antenna had been higher. However, it's sufficient to say that the transceiver gave a good performance for the conditions I used for the tests.

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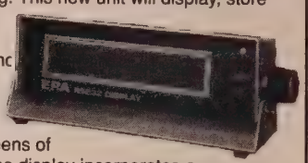

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**AA2 Kit: £8.50** **Assembled PCB module: £12.90**

### *AA4 ACTIVE ANTENNA FOR SCANNERS*

The **HOWES AA4** gives full coverage from 25 to 1300MHz in a neat compact package. The antenna is only just over 16 inches long, and is designed to be the answer to space/visability problems for home or portable operation. A low noise microwave IC is used as the active element. This "high tech" approach gives good performance with a low parts count, making construction straightforward. Reviewed in the November '90 *Short Wave Magazine*. Excellent performance in a small space!
**AA4 Kit: £19.80** **Assembled PCB modules: £26.80**

### *SPA4 BROADBAND PRE-AMP*

The **HOWES SPA4** is a low noise IC pre-amp covering 4 to 1300MHz for use with wideband passive antennas (discones etc). If signals tend to be rather week in your area, then the SPA4 could be just what you need!
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NEW! **ADD-ON DIGITAL READ OUT**

The new **HOWES DFD4** Digital Frequency Display adds "Digital Readout" to analogue type receivers and transcievers. If you own an FRG7, FT101, TS520, etc., then we had you in mind when we designed this kit. You can even add digital readout to a surplus WW2 receiver, or domestic broadcast set.

The **DFD4** can accomodate any IF frequency offset, VFOs that tune normally or "backwards" - all with a resolution of 100Hz. Versatile indeed! A small buffer module for easy connection to the radio is included in the kit. Why not give me a ring to discuss its use with your rig, or send an SAE for more details?
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**72 & 73 from Dave G4KQH, Technical Manager**

**Table of tests compared with and in accordance with the maker's specifications are provided below. All tests were carried out to EIA standards.**

| Manufacturer's Specification | Measured Performance |
|---|---|
| Frequency control p.l.l. | All channels to within ±5 to 10Hz |
| Receiver sensitivity | 700mV for 10dB (S+N)N<1µV |
| Receiver selectivity | >45dB±10kHz 48dB |
| Transmitter output protection | Tested with high s.w.r., and open and short circuit at r.f. output. OK |
| Antenna Input Impedance (Z) | 50Ω (SO239 socket) Agreed |
| Nominal r.f. output power | 4.25W with 12V d.c. supply<br>5W with 13.8V d.c., 4W (with f.m.) |

**Other features**

Filtered d.c. input (alternator interference suppression), no mechanical relays (diode switching), external speaker socket (8Ω). Low profile components on single-sided p.c.b. Weight: 740gm.

### Mobile Tests

For mobile tests, I used a typical base-loaded magnetically-mounted 27MHz whip at the car roof centre. I didn't have any difficulty with the antenna loading, or obtaining minimal s.w.r., and as the car was already ignition and alternator suppressed, there were no problems on that score either.

Mounting a CB transceiver in the most convenient place for safe operation, can present a problem in some cars. The ideal position is in front and a little to the right of the driver. It can be either above or below the dashboard, depending on space.

Placing the rig in the position suggested, allows the microphone to be held in the right hand without its cable being overstretched. It also helps to stop the cable getting caught up with the steering wheel shaft, brake or gear levers.

### Field Strength Trials

Several test runs during field strength trials, showed that readable signals could be recorded at the base station (with the antenna I mentioned earlier) from distances of 6 to 10km, along different routes with different ground contours, etc.

A typical record of signal strength versus distance obtained from my tests, is shown in **Fig. 2**. The record clearly shows the effect of changing height along the route.

By the way, on test the bar type l.e.d. S-meter on the rig indicated received signal level as follows: One lit = 4µV, two lit = 20µV, three lit = 300µV, all four lit = 600µV or more. In other words S-9 +, or you may prefer the CB term 'wall-to-wall'!

*Quaynotes*

**My thanks go to Nevada Communications of 189 London Road, North End, Portsmouth, Hampshire PO2 9AE, tel: (0705) 662145, for the loan of the test transceiver which is available from them at £69.95 including VAT, plus £3.45 post and packing.**
**That's the lot for now. Next month I'm going to take a look at the problems encountered with s.w.r. Cheerio!**

## *Mathmatics for the RAE. Continued from page 43.*

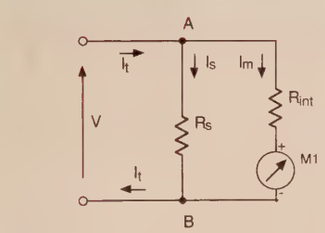



**Fig. 3.**

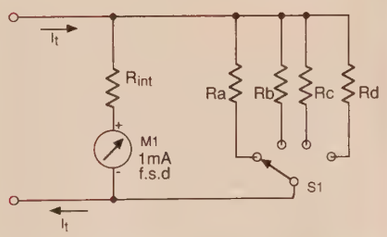



**Fig. 4.**

**Fig. 3: Use this circuit for questions i, ii, and iii in the text.**

**Fig. 4: This is the circuit to be used when answering question iv.**

*The total current flowing into (and out of) a circuit is the sum of the currents flowing in the parallel resistors.*

### Testing Time

Let's have a few questions to help you to digest this month's lesson, and I shall be using the diagram of Fig. 3 for these problems.

i) I have a meter of 1mA f.s.d. and internal resistance ($R_{int}$) of 100Ω. I wish to measure a current ($I_t$) of 10mA. work out the value of $R_s$ needed to do this?

ii) Using the same meter (f.s.d. of 1mA, and $R_{int}$ of 100Ω). If $R_s$ is 0.1Ω, what is the maximum current ($I_t$) that would be equivalent to f.s.d on the meter?

iii) An unknown meter has an $R_{int}$ of 100Ω and $R_s$ is 0.01Ω. The total current, $I_t$, was measured as 1A at full scale deflection of the meter. What is your estimation of the f.s.d. of the meter itself? (Hint look upon it as $I_{R2}$ in the diagram of Fig. 1).

iv) Look at the diagram of **Fig. 4**. It shows a small ammeter, consisting of meter M1 ($R_{int}$ 100Ω and 1mA f.s.d.), and several parallel resistors which may be switched in individually to give differing values of $I_t$. Calculate what each resistor has to be if;

a) with $R_a$ selected, $I_t$ is to be 10mA
b) with $R_b$ selected, $I_t$ is to be 100mA
c) with $R_c$ selected, $I_t$ is to be 500mA
d) with $R_d$ selected, $I_t$ is to be 1A

***Answers next month, see you then!***

*The Icom IC-R7100 wide-band receiver is now available in a modified version to cover the h.f. bands. As it sounded interesting, we asked Tex Swann G1TEX, to try the receiver on behalf of* PW.

# Icom IC-R7100HF Receiver

Review

"How do you feel, about reviewing a v.h.f. receiver that's been modified to cover h.f. Tex", asked the editor one morning. Eager to try almost any equipment out, I agreed at once, and then settled back to await its arrival.

When the receiver arrived a few days later, I was absolutely amazed at the weight of this small, table-top receiver. The IC-R7100HF only measures 241 x 94 x 240mm, but it weighs in at a little over (a staggering) 6kg. That, for those of you who aren't metricated yet, is just under a stone in weight, and it's the first indication of just how much is packed into this set!

This particular Icom receiver may be a table-top design, but there will be no chance of sweeping it from the table, or dislodging it! It stayed firmly, and solidly in place (wherever it was) throughout the period I had it on review.

## General Description

I'll start by providing a general description of the receiver, before looking at it in greater detail. As I have already mentioned, the IC-R7100HF is deceptively heavy, but it has very clean lines and looks very good anywhere.

The designers have put a lot of thought into their work. There's even a front 'leg', which folds out to tilt the facia to the correct angle for table-top working.

On the right-hand side of the well laid-out front panel is a calculator-style key pad. A large rotary-type knob controls the frequency, and this was mounted to the right of the centre panel, under a nicely laid out, and well lit l.c.d. screen.

At the bottom of the front panel, there are a series of switches controlling scanning functions (more of this later), the clock timer and h.f. up converter. The power, noise blanker/a.f.c. and attenuator switches are ranged together on the left-hand side of the control panel. Audio level and squelch controls are set under a large S-meter, and along with the headphone socket this completes the front panel controls.

## Back Panel Facilities

On the back panel, there are almost as many facilities. These consist of a.c. and d.c power sockets, two antenna sockets and an earthing point.

There are also six small 3.5mm jack sockets which make available such things as: line audio output, a tape recorder control signal and the 10.7MHz i.f.

As you would expect, there is an external speaker jack socket, along with a computer control jack. Finally, there's an a.g.c. control socket for connection to an optional TV-R7100 unit. This unit is a TV decoder add-on.

## Key-pad Entry

The frequency may be selected by either key-pad entry, or by operation of the large, smooth-acting rotary tuning knob. On the large back-lit l.c.d. screen, the frequency was displayed, to a resolution of 100Hz.

Towards the right-hand side of the main display, the memory in use is shown. There are 900 of these, available in nine banks of 100!

When choosing the frequency from the key-pad, I had only one criticism. The keys are rather close to the rotary knob. I think that many left-handed people may find some of the operations involving simultaneous key presses difficult.

## Memory Facility

The memory facility stores the frequency, mode and the step-rate in use at the time of selection. On recalling a memory, the frequency may be immediately changed by rotation of the tuning knob.

I found this feature very useful, when I set up the various calling channel frequencies on the amateur bands. I found I could then change rapidly and accurately to any band, so that I could listen around.

There are 18 other memories, set aside as 'scan band edge markers'. When displayed, the markers have the middle digit replaced with a 'P' ('0P1', '0P2', etc.).

Nine pairs of frequencies may be entered. The chosen frequencies may then be used as scan limits, in any of the five scan modes.

Memories 800-899 are special. They hold the frequencies where there is activity, when the receiver is in auto-memorise mode.

Put simply, the rig is set to scan, and as a frequency is found with activity on it, that frequency is entered into one of the 800 series

memories. After each save, the memory counter is incremented to the next memory. This can be a great help for finding out what the active channels are, on 144MHz let's say, when you're active from a holiday location.

## Five Forms

As I've already briefly mentioned, there are five forms of simple scan available. These basic methods can then be combined to form more complex forms to suit the situation. The five modes are as follows:

**Simple scan**: the frequency is incremented from the frequency held in the active lower band edge marker. The action continues, until the frequency would end up being above the upper band-edge marker. The receiver then returns to the lower edge frequency, and repeats the procedure.

**Auto memorise**: As above but as each channel is checked for activity, it's placed into memories in the range 800-899. Only one mode may be in use at any one time.

**Memory scan**: Frequencies contained in all the active memories are scanned. No account is taken of the mode in use on that frequency.

**Selected Scan**: Only memory locations using one mode are scanned. So, all f.m. channels may be scanned, or all a.m., etc. Other modes are not used.

**Window scan**: I wasn't sure about this method until I tried it out! It's actually a guard band 'watch type' of scan. The frequency in the 'back window' is the guard frequency, while the operator is listening to the channel shown on the display.

All the methods of scanning I've described, are available on many different scanning receivers from different manufacturers. However, what makes the IC-R7100HF different is that the facilities may be combined.

To help illustrate this technique, I'll tackle it the following way. I suggest that you imagine you've become 'fed up' listening to a band of frequencies, in the hope of hearing something.

The combining feature now comes into play, when you make this band of frequencies the 'back window', and pick out another channel. It could be, for example, your local f.m. broadcasting station.

When you set up the required watch period ratio, and start it going, the receiver scans the 'back window' channels at regular intervals, listening for activity before returning to the local station's frequency.

## Up-Converted HF

What sets this rig apart from the crowd, is the up-converter fitted to allow frequencies below 25MHz to be received. For this facility, there's a separate phono-type socket on the back panel for an h.f. antenna.

The phono socket is brought into operation when the dimmer switch is pressed. The dimmer switch itself has been remarked 'HF', with a small sticker-type label.

Due to the recent nature of the modification, only a typed note was available as instructions. This proved more than adequate to operate the rig itself, but gave no indications of the specifications (see separate table in **Fig. 1**. for specifications).

## Simple Instructions

The instructions for the h.f. operation were really simple! They only tell you to set the 'HF' switch 'in', and add 100MHz to the frequency you wish to listen to when using the keyboard entry method.

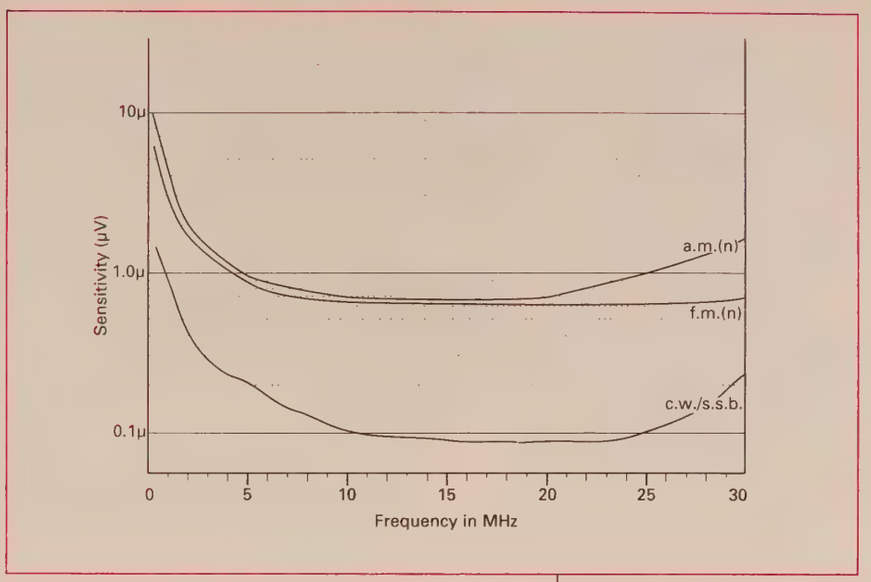



**Fig. 1: Tex Swann's sensitivity curves for the h.f. bands.**

I found that the modification worked well overall, and signals in the h.f. band were clearly heard, displayed at their actual frequency. The 144MHz band was shown as '14·...' on the display when on h.f. Due to the short time I had with the IC-R7100HF, and not having a suitable antenna, I had to erect one quickly!

## Lively Band Conditions

Once I had my antenna up, the receiver showed that band conditions were lively. Because of this, I made frequent use of the built-in 20dB attenuator, to reduce the level of the very strong signals in some parts of the 6-10MHz range.

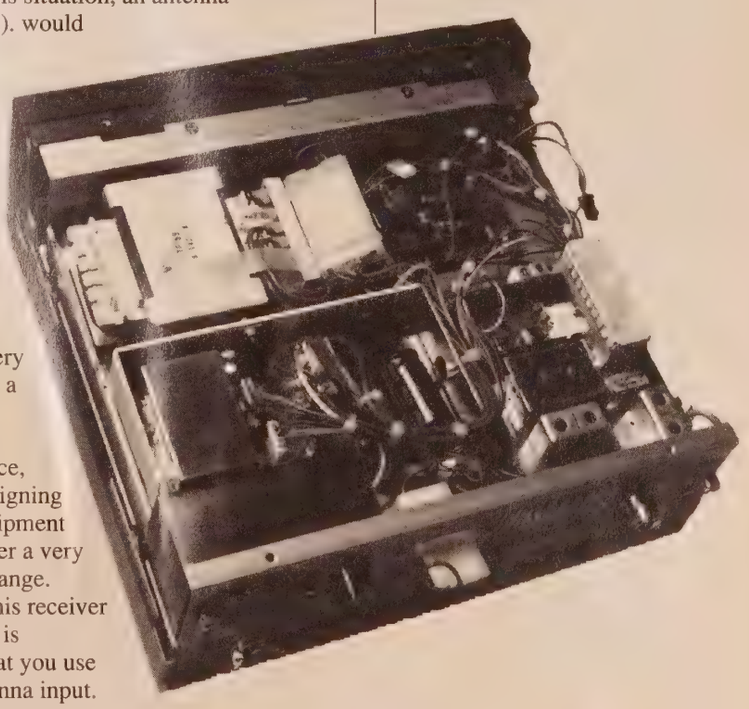
It was in the 6-10MHz range that I found the only real problem with the IC-R7100HF. Even on a.m. (narrow) mode, some signals seemed to occupy far more of the band, than I used to find on my old RA17 receiver. On these very crowded frequency bands, i.f.s with a better shape factor are needed to minimise this problem.

## Dynamic Range

At times, the dynamic range of the rig seemed to be exceeded, causing spurious signals to be received. I also noted evidence of some cross-modulation. In this situation, an antenna tuning unit (a.t.u.). would prove very useful, to provide a little more rejection of unwanted signals.

I should mention that the cross-modulation, is not a complaint specific to this very fine receiver. It's a problem all equipment manufacturers face, when they're designing and building equipment which has to cover a very wide frequency range.

When using this receiver above 25MHz, it is recommended that you use the standard antenna input.



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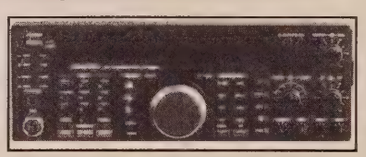

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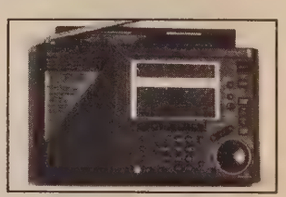

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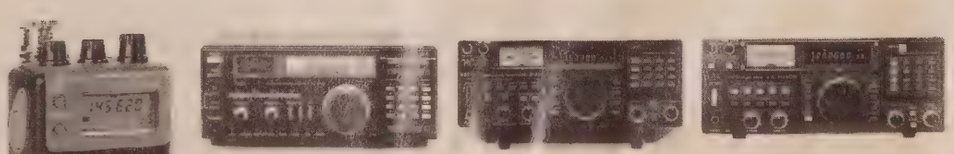

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RSGB

**The rear panel of the IC-R7100HF claerly demonstrates the many facilities provided on this receiver.**

## Summary

**Although I only had the receiver for a few days, and didn't have much time to 'play' with it, I thoroughly enjoyed the experience. It was simple to use, and the lack of information about the h.f. side in no way spoiled my pleasure using the rig.**

**I found the IC-R7100HF easy to use, and the 40-page A4 size user manual was also simple to understand and had many illustrations to help the reader.**

**The set, although weighty, is nice to use, is good-looking and has a very solid appearance. The Icom IC-R7100HF's strength lies in the 25MHz to 2GHz range, in which it is excellent. It was well up to the quoted specification on the v.h.f./u.h.f. range.**

**The receiver has only a few minor 'funnies' on the h.f. bands, but none of these spoilt my listening. However, it needs some help to achieve the best on the crowded h.f. bands (a problem shared with many wide frequency range receivers and the use of an a.t.u. is advised on h.f.).**

**Altogether, and with everything I've mentioned taken into account, I liked the IC-R7100HF and would very much like to be the proud owner of this version.**

**My thanks for the loan of the review model go to Martin Lynch G4HKS of the Amateur Radio Exchange Centre, 286 Northfield Avenue, Ealing, London W5 4UB, tel: 081-566 1120, who can supply the IC-R7100HF with h.f. modification at £1120, plus £10 carriage and VAT.**

## Specifications

| | |
|---|---|
| **Frequency covered** | **50kHz-1999.999MHz** |
| Tuning step rate | 100Hz, 1, 5 10, 12.5, 20, 25 and 100kHz. Plus 1MHz steps with the 'MHz' button active. |
| **Intermediate frequencies** | |
| Triple conversion for s.s.b. a.m. and f.m.(n) | |
| Double conversion for f.m. (w) | |
| 1st i.f | 778.7MHz(all modes: 25-512MHz) 226.7MHz (all modes: 512 to 1.025GHz) |
| | Crystal converter in use above 1.025GHz |
| 2nd i.f. | 10.7MHz (all modes) available on the back panel. |
| 3rd i.f. | 455kHz (not wide band f.m.) |
| **Bandwidths** | Specified |
| Mode s.s.b. | 2.4kHz at -6dB |
| Mode a.m., f.m. (n) | 6kHz at -6dB |
| Mode a.m.(w) f.m. | 15kHz at -6dB |
| Mode f.m. (w) | 150kHz -6dB |
| Spurious signals | -50dB |
| **Sensitivity** | Specified 25MHz to 2GHz |
| s.s.b. | <0.2µV for 10dB s/n |
| a.m. | <1.6µV for 10 dB s/n |
| f.m.(w) | <1µV for 12dB SINAD |
| f.m. (n) | <0.35µV for 12 dB SINAD |
| **Frequency stability** | Specified over 0 to 50°C |
| 25-250MHz | better than ±1.5kHz |
| 25MHz to 1GHz | better than ±5p.p.m. |
| 1.24 to 1.3GHz | better than ±10p.p.m. |
| **Modes available** | |
| s.s.b. | Both sidebands (noise blanker available) |
| a.m. | Narrow and wide band (noise blanker available) |
| f.m. | Narrow and wide band (a.f.c. available) |
| **Memories** | |
| Main | 900 in nine banks of 100. These store frequency, mode, step rate in operation at the time and the 'skipped on scan' flag. |
| Special | Nine pairs of scan band edge markers. |
| **Physical** | |
| Dimension | 241 x 94 x 239mm (w,h,d) |
| Weight | 5kg |
| **Electrical** | |
| Audio output | better than 2W at 10% distortion. |
| Power | 100,117, or 240V a.c. or 13.8V d.c. (1.5 to 1.9A on 13.8V d.c.) |
| Antenna connections | 50Ω 'N' type for 25MHz to 2GHz phono socket 0-25MHz |
| Temperature | May be used -10° to 60°C |

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### AR1500

The AR1500 is a hand held wide band receiver featuring SSB as standard, many said it couldn't be done! Coverage is from 500kHz to 1300MHz with no gaps. Channel steps are programmable in multiples of 5kHz and 12.5kHz. Modes available are NFM, WFM, AM and SSB (USB, LSB and CW with the BFO switched on). Many features have been carried across from the popular and reliable AR2000 receiver but fitted into an even smaller cabinet, the AR1500 truly has to be seen to be believed. There are 1000 memory channels and the usual AOR collection of search, lockout, priority etc. Power is from an internally fitted NiCad pack or from an external 12V D.C. source, all accessories are provided to enable you to switch on and start listening. All this from a small cabinet of approximately 170mm (H), 55mm (W), 45mm (D) including projections except aerial. The weight is a mere 345g with NiCads fitted.

### AR3000A

The AR3000A is a follow on from the highly acclaimed AR3000. Many major improvements have been implemented at the request of enthusiasts. The tuning control is now 'free running' to provide a smooth feel for SSB/CW, x10 buttons have been added to make step size faster and more convenient. All information is contained on the LCD instead of a separate status LED indication. The RS232 facility has a switch on the rear panel to enable/disable operation. Memory clear and full microprocessor reset functions are available from the front panel. The re-writing of microprocessor firmware using an even more efficient language has further increased scan and search speeds.

### Radio Facsimile Terminal WX-2000

The WX2000 is a stand alone radio facsimile terminal designed to produce hard copy images from various facsimile services including weather charts, maps, news media and even satellite pictures from NOAA, GOES and METEOR etc. The WX2000 simply requires an audio signal from a shortwave or satellite receiver capable of receiving facsimile signals. The built-in high resolution (8 dots per mm) thermal line printer produces crisp images with high resolution. The WX2000 is also capable of simulating grey scale which is ideal for automatic picture transmission by weather satellites.
In addition to the basic functions, the WX2000 provides full operation controls such as auto start, sync, adjustment, position alignment, tuning LED etc., to produce the highest quality images. The power requirement is 12-13.5V D.C. @ 3A, this makes the WX2000 ideal for both on land and off shore applications.
*Printing method:* Thermal line printer 8 dots per mm. *Printing scale:* 2 (B/W) or 16, selectable. *Paper width:* A4 (210mm) x 30m. *Audio Input:* FM1900+/-400Hz 0.7V/600 OHM; AM 2400Hz 0-1V/600 OHM. *Auto start:* APSS type. *Synchronisation:* Independent type. *Reception speed:* 60, 90, 120 and 240 rpm, selectable. *Collaboration factor:* 576 or 288. *Power requirements:* 12-13.5V D.C. @ 3A. *Size:* 310mm (W) x 70mm (H) x 200mm (D)



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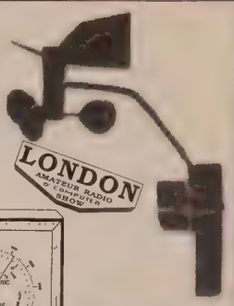


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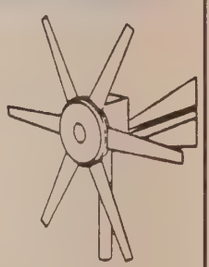

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# Reflections

*This month, Ron Ham starts off by inviting us into his office, before taking a look at how meteorological conditions effect Band II.*

While writing my columns, my office radio is usually tuned to either BBC Radios 2 or 4, and especially the science programmes, or I have a tape playing a brass band or some country and western music. The former is the Band II section of a YOKO TV8M (v.h.f./u.h.f. TV receiver) and the latter is a Sharp WQ-T238 portable stereo.

With very few exceptions, my musical favourites are limited to Sousa and Dolly Parton respectively! For convenience, the YOKO sits on a shelf immediately above my Amstrad PC2286, therefore it is fed, via a coaxial cable, from an outside dipole, thus screening-out any 'twittering' noises picked up from the computer at such close range.

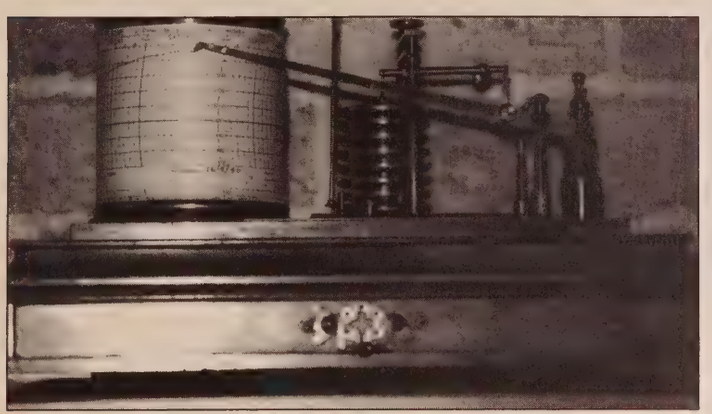

**Fig. 1: Ron Ham's Short & Mason barograph, indicated 1046mb, midday 3 March 1990.**

## Band II French Opening

The radio was in use while I was preparing this column during the evening of December 6, when suddenly, French broadcasts began pounding in on top of the BBC and ILR stations in parts of Band II. This was caused by a tropospheric opening. Conditions were right, the weather was cold and clear, the outside temperature was 31° 'F' and falling and my barograph indicated a very high pressure of 30.6in (1036mb). Not quite as high as the 30.9in (1046mb), **Fig. 1**, that it reached on 3 March 1990.

**John Edwards** (Edinburgh), is among our readers who wants to know more about the workings of a barograph. So, I selected the photograph, **Fig. 1**, to show the pile of eight aneroids that sense the pressure changes, and the linkage mechanism that moves the pen arm. The drum carrying the chart is a seven day clock which I wind each Monday, using the large internal key seen at the top of **Fig. 2**. I change the chart at the same time. The bottle contains the special ink for filling the pen. It only requires a few drops to fill the nib, and a ladle is provided under the bottle cap for this purpose. Replacement weekly charts, with the option of a Sunday or Monday start, are often stocked in packs of 52 or 104 by jewellers.

## Tropospheric

My writings often associate openings in the v.h.f. and u.h.f bands, to changes in the atmospheric pressure as recorded by the Short & Mason barograph, **Figs. 1** and **2**, that sits on the mantelpiece in my office. I have used this particular instrument for over 30 years, and in that time it has frequently shown, that when the atmospheric pressure is high, a tropospheric opening is most likely to begin shortly before the pressure starts to fall.

The difference between a barograph and a barometer is that one has enlarged mechanics. This is so that it can push a pen across a moving paper chart. An ordinary barometer usually has just a single aneroid to swing a pointer around a fixed outer scale. Both are normally calibrated within the range of 28.0 to 31.0in and/or 950 to 1050mb.

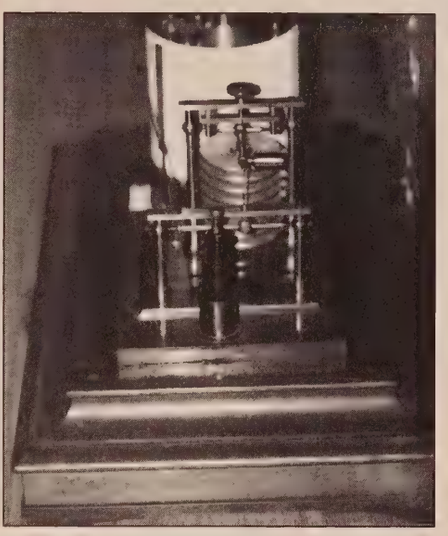

**Fig. 2: The Short & Mason, showing winding key in drum.**

"For the last few days a high pressure area has been stable over Ireland and Britain, giving good trop reception all over," wrote **Des Walsh** (Ballinhassig) on December 4. Des uses a Pioneer tuner and has a variety of antennas, including a modified 4-element Yagi which gives him good results in the upper region of Band II. On the 4th he logged several stations from France and two from Germany between 95 and 106MHz. **Simon Hamer** (New Radnor) found Band II wide open on November 22 and 23 when he logged stations from Belgium, France, Germany, Holland, Ireland, Poland and Scandinavia.

## VHF Propagation

Like Des and Simon, many radio enthusiasts are interested in signals that exceed their normal range due to some form of disturbance within the earth's complex atmosphere. One area of the radio frequency spectrum that can give great satisfaction to DXers lies between 26 and 106MHz, **Fig. 3**. It is well used and is ideal to study such modes of propagation as auroral and ionospheric reflection, meteor-scatter and tropospheric ducting. The reason why this area is so interesting, is that within this range there are three amateur bands, 28, 50 and 70MHz, the CB allocation, around 27MHz, two f.m. radio broadcast bands, 68-73 (East-European) and 87.5-106MHz (international), Band I television, 40-68MHz (no longer used in the UK) and Band II television used in Eastern Europe and the USSR.

My colleague 'Quaynotes' tells me that there are 40 CB channels between 26.965 and 27.405MHz (CEPT) and another 40 for the UK between 27.601 and 27.991MHz. Despite their low power, transmissions on any of these CB channels can be heard up to 1500km away while an intense Sporadic-E disturbance is in progress.

They can be heard in the same way that the East European television channels R4 and R5 can be heard in the UK, in other words 'mixed up' with 'local' programs in Band II. The vision and sound frequencies of Chs. R3 (77.25/83.75MHz), R4 (85.25/91.75MHz) and R5 (93.25/99.75MHz) are indicated by the dotted lines on the top right of **Fig. 3**.

## Early VHF Sets

One of the first tuneable v.h.f. communications receivers, which

| CB | A | TV | A | TV | A | Chs R3 | R4 | R5 TV |
|---|---|---|---|---|---|---|---|---|
| 26.27. | 28-30. | 40.45.50. | | 55.60.65.70. | | 75.80.85. | | 90.95.100.105 |
| 11m | 10m | Band I | | | RB | | | Radio Band II |

**Fig. 3: Approximate bands.**

was originally used by the US Navy during WWII, is the the Hallicrafters S27. These receivers covered approximately 19 to 140MHz in three bands. A photograph of this set can be seen on page 25 of the BBC publication *The Secret War*, by Brian Johnson, in the first section devoted to 'The Battle of the Beams'. Your public library may have a copy of this most interesting work.

The S27 and another version the S36 were in great demand on the surplus market in the late 1940s, and are sought after by some collectors today. During the early 1950s, Eddystone produced the 770R, and a few years later the R216 was designed for the military.

Over the past 40 years I have used and serviced all three of these receivers and some are still in use, but, by today's standards they are all a bit 'deaf' and leave a lot to be desired. However, a wide-band TV pre-amplifier works wonders at the front-end.

Each receiver is a superheterodyne with intermediate frequencies in the 5MHz region. The S27 has three acorn valves in its tuner, the 770R uses EF95s and the R216 sports a couple of EF91s and a CS2A crystal diode mixer. In my view, these early sets were years ahead of their time, because they were well designed and engineered and featured large clear dials with good drive mechanisms.

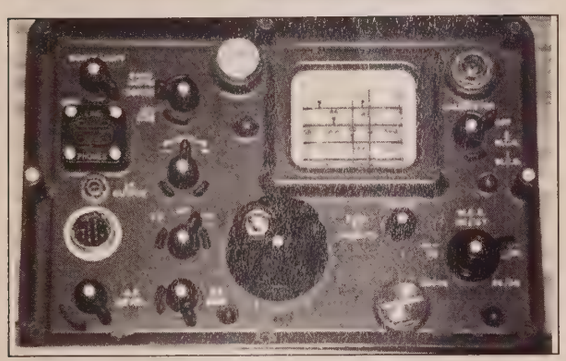

**Fig. 4: The R216 receiver.**

The 770R and the R216 have turret tuners, a style which later became the norm in the masses of multi-channel v.h.f. television sets that followed. **Should any of you obtain one of these early sets, BEWARE of high voltages and PLEASE, DO NOT attempt to repair it unless you really know what you are doing. Get some advice from a qualified service engineer.**

## The R216

Several readers, knowing that I had an R216, **Fig. 4**, have asked for some information about it. Firstly, the set has a mixture of 6.3V indirectly heated valves and 1.4V directly heated valves. Therefore it is essential that the proper power unit, **Fig. 5,** and interconnecting lead is used to deliver the correct high and low tension voltages required to drive the set.

The mains voltage selector and 1.4V l.t. potentiometer (upper left and lower right respectively) must be set correctly in conjunction with the meter and test switch (top right and bottom left respectively), on the front panel of **Fig. 5**. The receiver itself has five useful ranges, 19-30, 30-46, 46-68, 68-101 and 101-157MHz, each spread over about 2.5m of film strip scale.

The tuning is aided by the 1 and 5MHz crystal calibrator (top right, **Fig. 4**). For instance, to work around 50MHz, the user would switch in the 5MHz crystal and align the cursor (below dial on the right) and the 50MHz mark on the main dial (large knob) to the centre of the 5MHz carrier. The 1MHz marker can then be used to check the 49 and 51MHz points. When finished, the calibrator must be switched to the off position before the set will work. A close study of the left side of **Fig. 4**, will show the positions of the dial-light dimmer, i.f. band-width selector (30 or 120kHz), the mode switch and the gain controls. Because of the very strong signals received during a Sporadic-E opening, this set is ideal for tuning through the range suggested in **Fig. 3**.

## Observations

Last month I told you about the 'stop press' report I had received from **Ron Livesey** (Edinburgh), who is the auroral co-ordinator for the British Astronomical Association, about the great aurora on November 8. Since then the following information has come my way. "Enjoyed that Northern Lights spectacular on the evening of November 8," wrote Simon Hamer who added, "the night sky was lit up in a glowing red." At 2230 Simon tuned his DXTV gear and found auroral distorted pictures from Ireland's 'RTE' and several European stations.

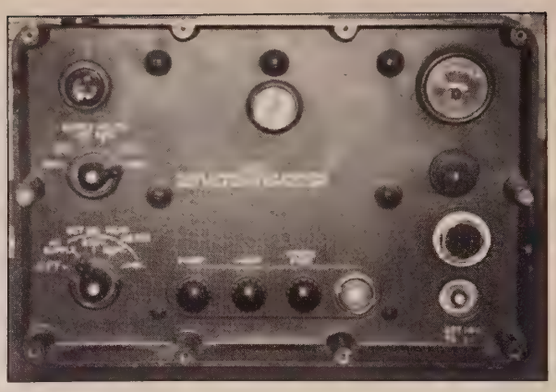

**Fig. 5: R216 power unit.**

When aurora was present, I have heard a rough 'burbling' in place of the signal when the R216 was tuned to the sound or vision frequencies of such stations. Ron Livesey received reports of 'glows' overnight on November 2, 5, 6, 11, 13, 28 and 29, 'rays', on the 3rd, 9th, 14th, and 19th, 'active forms', on the 16th and 18th, 'corona', on the 4th and 8th, and 'all sky', on the 1st. Although the majority of these events were reported from Scotland, the 'arc' on the 10th, the 'glow' on the 11th and the 'rays' on the 19th were seen by an average of 3 observers from England.

**Gordon Foote** (Didcot) heard the German beacon, DK0WCY, on 10.144MHz, give auroral warnings on November 1, 8, 9, 10, 16 and 17. **Doug Smillie** (Wishaw) reports weak auroral reflected radio signals on November 15, 16, 17, 20 and 22 and strong on days 1, 8, 9, 19 and 21 and **Tony Hopwood** (Worcester) detected tone-A signals on days 1, 4, 8, 9 and 19.

We know that the sun was active during the middle of November, and in addition to aurora **Fred Pallant** (Storrington) tells me that the 28MHz band was almost dead on the 9th and 19th and Gordon Foote found it "particularly bad" on the 19th. While the upper ionospheric region was disturbed throughout the morning of the 13th, Simon Hamer received smeary, multi-image television pictures from Australia on 46.172MHz and New Zealand on 45.25MHz and Dubai, Iran, Malaysia and Thailand on Ch. E2 (48.25MHz).

## Solar And Magnetic

During November Ron Livesey, using a two inch refractor telescope and a 4in projection screen, located three active areas on the sun's disc on days 5, 6, 15 and 29, four, on days 1, 7, 11, 14, 19, 27 and 28, seven, on the 9th and ten on the 2nd. Although high cloud and haze hampered his observations, **Cmdr Henry Hatfield** (Sevenoaks), using his spectrohelioscope, located three sunspot groups on the 13th and 15th and 11 filaments on the 15th and 21st.

In addition to his own November observations with a 'jam jar' magnetometer, Ron Livesey received reports of magnetic storms being recorded on days 1, 2, 4, 8, 9, 11, 16 to 22 inclusive and 29 and 30 from Tony Hopwood, **Karl Lewis** (Saltash), **David Pettitt** (Carlisle) and Doug Smillie.

## Check Your Logs

My thanks are due to **Geoffrey Harris** (Sturminster Newton) for sending me some of the information he gathered about the intense solar activity during the first 15 days of June 1991. He reports that the period was "marked by no less than five X-12 solar flares and one X-10 flare." Of particular interest is the X-12 from the region of a sunspot on the eastern limb which commenced at 1509, peaked at 1529 and faded at 1614.

The X-ray flux, measured by the GOES-6 and 7 satellites, exceeded $10^{-4}$ watts/$m^2$ in both the 0.5-4.0 A and 1.0-8.0 A bands. "This was therefore a "local daytime" flare, with strong Type II and Type IV radio sweeps. It was also the largest flare of this cycle since the X-15 flare of October 1989," said Geoffrey. He added that a sudden change of magnetic field was recorded at Hartland around 1530, violent bursts of radio noise were recorded in Sevenoaks between 1505 and 1515 on 136MHz and between 1500 and 1520 on 1297MHz and a spray from the sun out to 0.5 solar radii was observed. Although I could not use all of Geoffrey's interesting report, this should be enough encouragement for you to re-open your radio logs and take another look at the afternoon of June 1.

## Meteor 'Pings'

Simon Hamer saw brief bursts ('pings') of pictures, via meteor trail reflection, at 1230 on Ch. R1 (49.75MHz) on November 21 and on Ch. E2 at 1830 on the 23rd.

*Cheerio for now!*

Reflections

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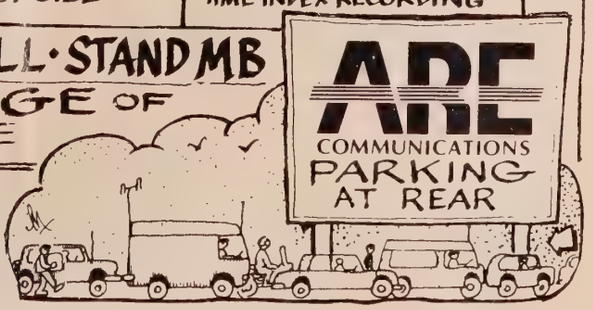

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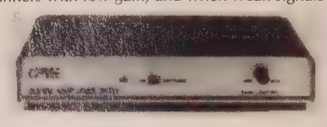

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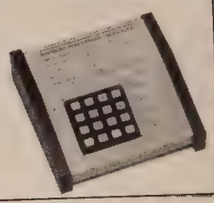

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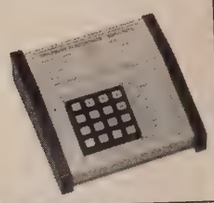

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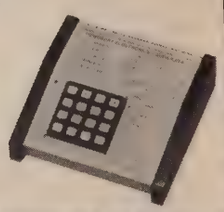

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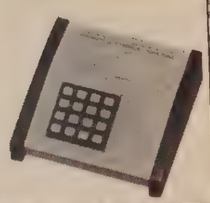

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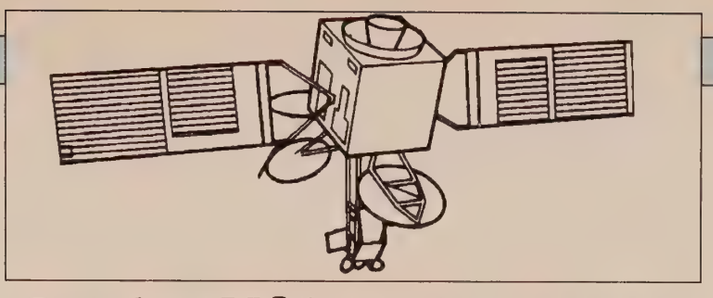


# Satellite Scene

**by Pat Gowen G3IOR**

*This month Pat Gowen G3IOR continues his look into what is happening on, with and to the many amateur satellites not fully covered by the last 'Satellite Scene'.*

## OSCAR-10

**Peter DB2OS**, reports that in December he found AO-10 randomly switching from its 145.812MHz general beacon, to the upper edge engineering beacon and to 'L' mode, where very strong signals were in evidence. To his amazement, he found that he was able to command the satellite successfully. Peter placed the Mode B beacon to plain carrier, and the associated transponder on again, to give excellent results.

**Graham VK5AGR**, found that although at times there was no sign whatsoever of the beacon(s), the transponder was fully operational. He therefore now countermands the previous advice of not using the transponder if the beacon is f.m.'ing. He also proposes that in future users should use AO-10's 'B' mode transponder, whenever it is found to be available to support meaningful transponder operations. Some clues to the best times are given by the following table, where the ALON, ALAT, squint angle and percentage of solar cell illumination are given to a calendar date.

| DATE | ALON | ALAT | SA | ILL % |
|---|---|---|---|---|
| Sat 01 Feb 92 | 315.7 | 14.4 | 06.0 | 99.5 |
| Sat 07 Mar 92 | 311.9 | 14.3 | 65.0 | 42.3 |
| Sat 11 Apr 92 | 308.0 | 13.9 | 68.9 | 36.0 |
| Sat 09 May 92 | 304.8 | 13.4 | 45.8 | 69.7 |
| Sat 06 Jun 92 | 301.7 | 12.8 | 20.4 | 93.8 |
| Sat 27 Jun 92 | 299.3 | 12.2 | 01.1 | 100.0 |

The OSCAR-10's omni-directional antennas still appear to be in use, so the best squint angle is that closest to 90°, with good results ±15° of that ideal position, when signals are quite strong if the satellite is within 20 000km.

## OSCAR-11

**Greg Jones G0/WD5IVD**, reports that a new version of the Forth diary software is now in operation on UO-11, which enhances the transmission of binary whole orbit data (WOD). Previously, WOD was transmitted as one entire block with a single survey header at the beginning. This gave problems, as users could miss the single survey header without having defined what the data represented. If the WOD sequence was interrupted by another scheduled transmission, the sequence started all over again from the beginning.

The new software transmits additional survey headers every 32 frames, and the entire dump is transmitted in a number of smaller sized windows as a continuous sequence. The improvements will reduce the possibility of not receiving the binary WOD, and eliminate the need for very long slots in the rotation. As a result, the amount of binary WOD has now been reduced to two minutes per cycle. Arrangements are now in hand for AMSAT-UK via G3RWL, to place regular bulletins on the satellite for all to catch the latest satellite news.

## OSCAR-12

Contrary to all expectations, FUJI-OSCAR-12 can still be frequently heard, and the satellite has usually been noticed when users were looking for its successor FO-20.

## OSCAR-13 DX

**John Fail KL7GRF/6**, runs a OSCAR-13 DX fund which accepts donations, which are then used to provide equipment hardware, funding, QSL costs and general support to get some of the rarer DXCC locations onto the satellite. Already BY1PK, CE0ZZZ, D68GA, FP/VE1KM, KH8/KA6NAL, PJ2BR, VQ9CQ, 4J1FS, 5V7JG, 9L/WD3Q and 9M6KT have been activated. Future support is now under consideration for DXpeditions to Belize and Pitcairn Island. If you wish to support such ventures, you may send your donation to him at 6170 Downey Avenue, Long Beach, CA 90805-3865, USA.

John also reports that some pretty exciting DXCC countries are now active on AO-13, including EA9MH, KH2/W1YRM, VK9ND and VP5/VE3CZ. Future DXpeditions are being planned from AP/PA3EON, HS0, J2, JA3GDP/JD1, KP2, UH8, UI8, VP2V, V3, VR6, ZC4SAT, 9G/KD6KQ and 3D2/K0RR.

## OSCAR-14

The Cosmic Ray Effects and Dosimetry Experiment on UoSAT-3 saw a significant 'Forbush' cosmic ray decrease, followed by a large solar flare late last year. Those wishing to monitor the satellite's data on this radiation, may use the CPE/TOE software available on UO-14 itself, which also holds files on the CREDO experiment. The data may be plotted using the SPLOT program.

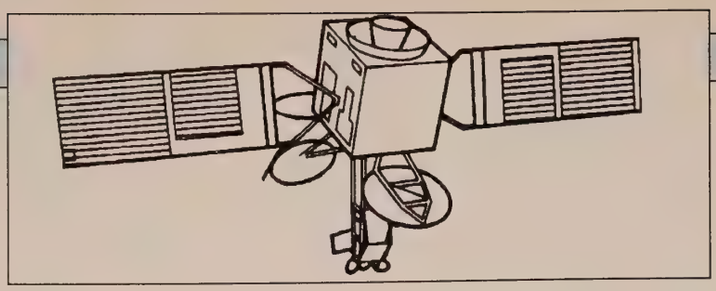
**Dave Hulatt G4WFQ**, **Rod Clews G3CDK**, and a large number of 9600 baud UO-3 enthusiasts, report severe difficulty in accessing the system, as success often impossible for days on end. Some think 'alligator' users are on the input, whilst some suspect that powerful amateur f.m. signals 'known to be illegally using the space band' are causing the problem.

The difficulty experienced may equally be brought about by the ever increasing popularity of the satellite and growing congestion due to the sheer number of stations all competing for use, particularly when the satellite is over Europe. **Geoff Ward G0/K8KA**, reports that since April last year 288 callsigns have been logged, 94 stations, usually log in each day, and that an average of 45 files are uploaded daily. These files total 350, each averaging 2.7 MegaBytes, and they usually stay aboard for five days.

## OSCAR-15

Nothing whatsoever has been heard of, or from, OSCAR-15, the second UoSAT spacecraft that went aloft with ARIANE, UoSAT-4 and the microsats. It now has to be assumed that this spacecraft is lost for all time.

*Continued on page 58*



## MICROSATS OSCAR-16/18/19

A few problems have been evidenced with the microsats. Several times they've 'crashed' and had to be reloaded. Many users report difficulties in establishing reliable packet communications links with PACSAT-OSCAR-16, WEBERSAT-OSCAR-18 and LUSAT-OSCAR-19 with their 4W downlink transmitters, while they experience few problems in copying FUJI-OSCAR-20's 1W downlink signal.

It is believed that the BPSK transmitters on AO-16, WO-18 and LO-19 suffer from random phase noise. James Miller G3RUH, has found peaks of ±27° on occasions with ±10° RMS scatter typical from all these satellites, and this random phase-noise is noticeable by using an oscilloscope placed on the output of the downlink receiver. If the horizontal sweep of the oscilloscope is adjusted to produce the 'eye diagram', zero-crossings of the transmitted waveform can be seen bouncing randomly around the pattern, when it should be remaining constant at the zero level. When FO-20's transmitted waveform is examined, it shows clean BPSK, with carrier shifts of either 0 or 180°, and nothing else.

It appears that the microsat BPSK phase noise, might be the result of a transmit synthesised oscillator design deficiency, or alternatively the result of poor BPSK modulator carrier suppression. Whatever the cause, this transmitted phase noise reduces the received signal-to-noise ratio. The demodulator's effectiveness is reduced by the difficulty in regenerating a 'clean' BPSK local carrier from the noisy input signal. That also degrades the phase detector's output signal-to-noise ratio, so further reducing the effectiveness of the BPSK demodulator.

A further reason for difficulty in copying packets from AO-16, WO-18 and LO-19 is the fact that these spacecraft transmit their AX.25 data on a continuous basis, while FO-20 remains lightly loaded, and it spends lots of its time transmitting the '01111110' AX.25 flags which the terminal node controller uses for frame synchronisation. Increasing the number of flags transmitted, helps keep the receiving TNC synchronised with the transmitted AX.25 packet frames. Experiments are now underway with raised-cosine transmissions from the various PACSAT spacecraft. They are being used to determine whether shaping the AX.25 modulating waveform increases the downlink signal-to-noise ratio.

## OSCAR-17

The DO-17, better known as 'DOVE', is still functioning and is in good condition. However, we must wait for the uploading and checking out of the software, that will eventually permit its voice to speak to the many patiently waiting to hear it.

## WEBERSAT WO-18

The WEBERSAT's impact detector has been gathering data almost every week since the beginning of August. It's also been collecting and sending WOD on channel numbers 26, 27, 28, 29, 2A and 35 to provide solar array currents and +Y array temperatures.

Pictures are also being taken and are sent when power, currently providing between 0.9 and 1.2 watts permit.

## LUSAT LO-19

The LUSAT LO-19 microsat has its BBS is operational, but the earlier scheduled Friday experimental days, using the rapidly Doppler shifting c.w. beacon, now seem to be missing.

## OSCAR-20

**Kazu JJ1WTK**, reports that FUJI-OSCAR-20 now operates a regular alternating schedule between Modes JA and JD. It's still cooling down. Users report low activity, but excellent results on both its analogue and digital modes.

## OSCAR-21

The OSCAR-21 satellite, also known as RS-14, suffers continuing problems, with little other than its regular c.w. beacon being heard on most passes. Several times, the parent satellite system has been closed down to enable a command reset of AO-21, and most times the transponder and RUDAK has come up working again. When it does, it really works perfectly, despite a few 'birdies' spread around the 144MHz band, e.g. 145.500MHz as discovered by OH5LK. Sadly, it only performs for a day at the most before reversion. Efforts to locate the exact cause of this problem continue, and the command stations have certainly not given up trying to rescue it yet.

A number of dedicated observers have reported hearing the RS-14 c.w. telemetry booming in on 29MHz, and have naturally suspected the presence of an undeclared Mode A transponder. Sadly, this is not so. The 145MHz output RS-14 telemetry beacon is being picked up by the Mode A RS ROBOT receivers, and hence re-transmitted on the ROBOT 29MHz transmitters!

## OSCAR-22

Greg reports that UO-22 continues to take between three and five pictures every day all round the world. Some of these, e.g. the major ice shelf break-off in Antarctica have been quite spectacular. For those lacking direct facilities for capture and production of these superb CCD shots, they will be soon be available on the newly installed AMSAT-UK/UoSAT BBS.

## SARA

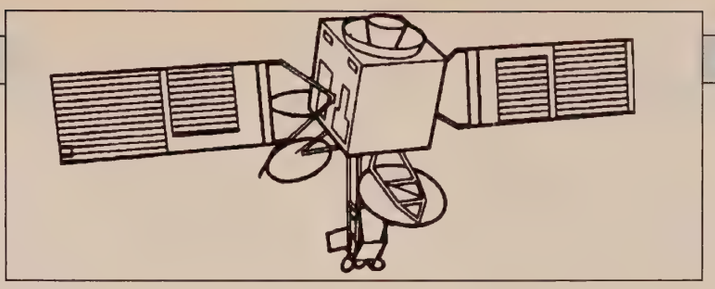
The debate on 'SARA' continues. While Joe Kasser, AMSAT telemetry head, John Branegan GM4IHJ, myself, and many scores of others are quite convinced of its rightful and desirable status as an amateur satellite in an amateur band for the use of amateurs, others, such as AMSAT-UK Secretary Ron Broadbent G3AAJ and IARU satellite co-ordinator nominee Freddy de Guchteneire ON6UG seem convinced otherwise. They still maintain that SARA is an intruder into the 145MHz amateur space band.

**M. S. Reda N0BML**, of Maple Grove Minnesota wrote to state that by my justification and comparison of SARA with the other similar satellites, I lose my defence of it. He points out the *FCC Rule Book* (ARRL) which specifically bans broadcasting satellites, and that the earlier UoSATs, BADR-1, DO-17 DOVE, WO-18 WEBERSAT and such, which do not support two-way amateur communications ARE in fact broadcasting, and are thus illegal. He writes "It (SARA) is NOT an 'amateur' satellite. It is a transponder between a sun-girdling planet to scientific experimenters on earth. Neither the planet nor the scientist is a radio amateur".

**Daniel ON1KVE** of BELAMSAT, the Belgian AMSAT Organisation, writes to say that he has been very busy. He also says he has received a great quantity of messages and queries regarding 'SARA', which he is unable to answer individually. He says "In co-operation with the SARA team in Paris, our group has decided to make a little book about SARA. This book will be terminated for the end of January and will contain all the information about this satellite, the reception of data, the telemetry details, and so on ...".

## Worked MIR

**Ray Soifer W2RS**, worked U5MIR on S22 145.550MHz f.m. voice while simultaneously hearing his packet operation. Observers in parts of the world other than Europe also report that U4MIR and U5MIR have both been operating at the same time on different frequencies. Whilst we know that the new 25W Icom-24-AT rig and the original 2.5W FT-290 are both in now use, the problem of the single MIR 144MHz external antenna arises. It has to be assumed that Sergei and Alex are now using the 143.625MHz v.h.f. communications antenna for amateur radio also. Other than direct communications whilst over Europe to the TsUP command station near Moscow, 143.625MHz is little used now, as political



change and the ensuing economic recession cuts have meant the withdrawal of many of the communications boats around the world, and more use of the global TDRS like chain of geostationary satellites.

The cosmonauts seem to have suddenly discovered the tuning knobs on their transceivers, as they have been coming up to make QSOs on all sorts frequencies. Ray W2RS, worked them on 145.500MHz, G3MFQ and I worked them on 145.550MHz, whilst both KB2E and N2KPC made a QSO on 145.900MHz. They apparently adapt rapidly to the three different IARU Region band plans met every thirty minutes as they orbit our world. Although 145.500MHz is in wide use over North America, over Europe, where it is the S20 calling channel, they have yet to be heard. On behalf of AMSAT, Ray W2RS asked Boris UW3AX, to pass on a request not to use the 145.800 - 146.000MHz Space Band.

**Rip WA2LQQ**, reports that he was planning to visit Musa, U2MIR, now UV3AM, who is in hospital suffering from what appears to be a latent effect of his long-term weightlessness, i.e., a recurrent inflammation of the joints. He was responding well to treatment and was expected to be home within a few days where he would enjoy a period of convalescence. If anyone wishes to send a 'get-well' card to Musa, post it to Vern Riportella WA2LQQ, PO Box 177, Warwick, NY 10990, USA. Rip frequently visits Moscow in the course of his work, and will deliver your greeting personally to Musa.

# Newsdesk Extra

## Eddystone Users Group

Eddystone Users Group is a specialist club for Eddystone radio enthusiasts. There's a regular club newsletter packed with much to interest the keen Eddystone enthusiast. Details from **W. E. Moore, Moore Cottage, 112 Edgeside Lane, Waterfoot, Rossendale, Lancs BB4 9TR.**

After the'PCB Special' in the February 1992 issue of *Practical Wireless*, many of you asked where to get p.c.b. design programs for your own computers. We didn't have enough space in that issue to give you a list of computer programs, so here is a short list of some of the p.c.b. design programs that are available, by machine.

Please remember if you ask for a demonstration disk to mention *Practical Wireless*.

For The IBM PC/AT (or clones);
**BoardMaker** (Demo disk available)
Tsien (UK) Limited
Cambridge Research Laboratories
181 Huntingdon Road
Cambridge CB3 0DJ.
Tel: (0223) 277777.

**EASY-PC** (Demo disk available)
Number One Systems Limited
Harding Way
Somersham Road
St. Ives
Huntingdon
Cambridge PE17 4WR.
Tel: (0480) 61778.

**PCB II and ARES** (Demo disk available)
Labcenter Electronics
14 Marriners Drive
Bradford BD9 4JT.
Tel: (0274) 542868.

**PC Trace** (Disk 2531)
**Quickroute** (Disk 2937)
('Shareware' versions)
PDSL
Winscombe House
Beacon Road
Crowborough
Sussex TN6 1UL.
Tel: (0892) 663298.

For the Archimedes and BBC computers;
**Arc PCB** and **Arc PCB Schematics**
(Demo disk available)
Silicon Vision Limited
Signal House
Lyon Road
Harrow
Middlesex HA1 2AG.
Tel: 081-422 2274.

**LINCAD**
Linear Graphics Limited
Unit 39
Mochdre Industrial Estate
Newtown
Powys SY16 4LE.
Tel: (0686) 629292.

## Cirkit Catalogue

The Winter 1991/1992 Cirkit Constructor's Catalogue is now available.

Again, Cirkit bring a whole range of new products, ranging from components such as wire wound resistors and capacitors, to test equipment such as a distortion analyser and a portable appliance tester, and a lot in between as well!

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SEND IN ALL YOUR NEWS TO OUR RESIDENT OFFICIAL GOSSIP, SHARON GEORGE, AT THE EDITORIAL OFFICES.

# PACKET PANORAMA

*Roger Cooke G3LDI continues his word and pictures report on the people, Packet and places 'Over The Pond'. This month he travels via America's west coast into Canada.*

After an enjoyable stay in Washington DC, first with Jack and Andrea Colson, then with Dick Daniels, we flew to Seattle in Washington State. After a seven hour flight, we landed, in what seemed like normal English weather, dull with some drizzle.

We were met at the airport by Dick and Beverley Bendicksen. Dick and Beverley visited me in 1962, so this was to be a 'return' visit. Although we hadn't met since 1962, we've kept skeds on h.f. regularly.

Dick and Beverly are thoroughly enjoying their new life. Retired now, they both worked for AT&T, one of the largest telephone companies in the USA. Dick N7ZL, pictured in **Fig. 1,** has his shack in the basement, spending most of his time working via satellite from his Seattle home. His system is so well set-up, that with no trouble at all, I kept a daily sked with Pat G3IOR via OSCAR 13.

Dick uses the packet network to provide him with the latest 'Kepsets' for his tracking program. Having been involved with digital communications for a living, it now holds little interest for him, so this is Dick's only use of packet radio. With the 'Instant-track' software, it is possible to have the data automatically loaded into the tracking program.

In Seattle, we visited a few amateur radio shops, meeting some of the locals. One day we travelled out to Lynnwood and met Mike Lamb N7ML. Mike gave us a conducted tour of AEA, including a close look at their new products. I think the price of these items will necessitate a win on the football pools in the UK! However, the tour was very enjoyable and the range of test and measurement equipment was very impressive.

On our last day in Seattle, a Sunday, we were up at 5am to catch the ferry from Seattle to Bremerton on the Kitsap peninsula. From there we drove north, crossing the Hood Canal using the new floating bridge.

Our eventual destination was Marrowstone Island in Puget Sound. Dick and Beverley have their summer home there. They found a super location on the edge of the bluff, overlooking Puget Sound. Dick has erected a three element tri-bander beam about 10m or so above ground. It certainly works quite well, in spite of its lack of height.

## Farewell To America

After an enjoyable last barbecue, we drove to Port Angeles, where we boarded a ferry, and said farewell to Dick, Beverley and America. Two hours later we landed at Victoria, Vancouver Island Canada, where we were met by Fred VE7PL, and his XYL Jean. This last week was spent sight-seeing on Vancouver Island.

We found time to visit Brent Ewing VE7BD, one of the keen DXers of the Victoria Club. His shack is shown in the photograph of **Fig. 2**. Outside is a 65m rotating tower with stacked beams for 14, 21 and 28MHz. There's also a 7MHz beam and some v.h.f./u.h.f. Yagi antennas at the top. All of this at a very attractive location overlooking the Saanich Inlet.

One very interesting visit, was to the Dominion Astrophysical Observatory just outside Victoria. This was on top of what I thought was a mountain, I was informed, that it wasn't strictly speaking a mountain! Whatever it was or is, with the excellent site and the 1.8m mirror, observations are taken each night. With state-of-the-art optics, information is gathered on Binary Stars, Dark Matter, Black Holes and Quasars.

On the Saturday of our last week, we went our separate ways. Of course there was an amateur radio meeting that day. It was 'Ham Happenings', a day of meetings, seminars and buying and selling equipment.

Organised by the Victoria Amateur Packet Radio Association (VAPRA), the event started at 10am with an introduction by Larry VE7DIE. Larry, the secretary of VAPRA, is shown at work on a repeater in **Fig. 3**. These commercial repeaters, designed for remote sites on mountain tops, have to be

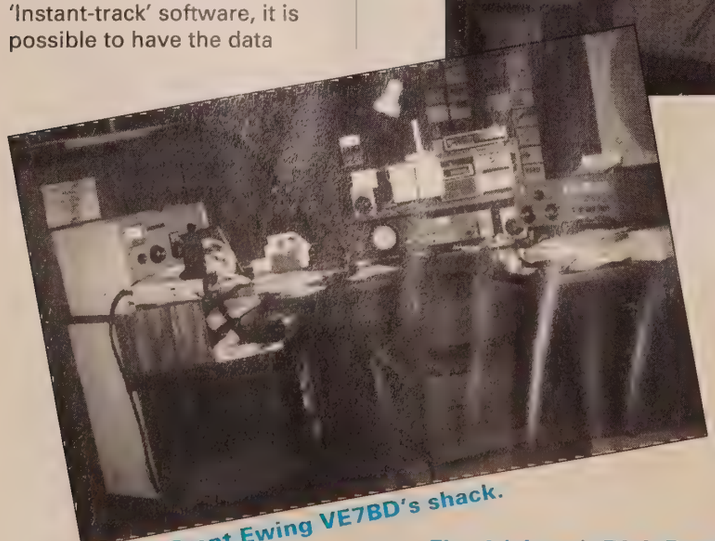


Fig. 2: Brent Ewing VE7BD's shack.

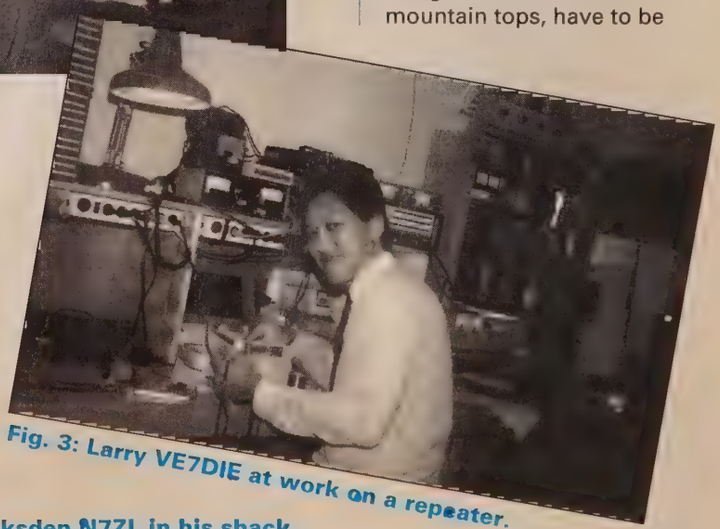


Fig. 3: Larry VE7DIE at work on a repeater.

Fig. 1 (above): Dick Bendicksden N7ZL in his shack.

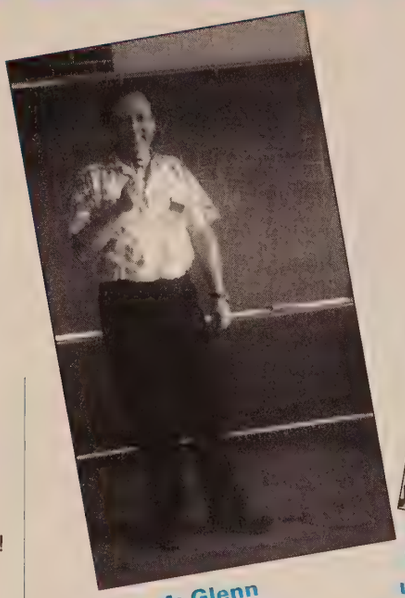


Fig. 4: Glenn Terrel VE7GCT.

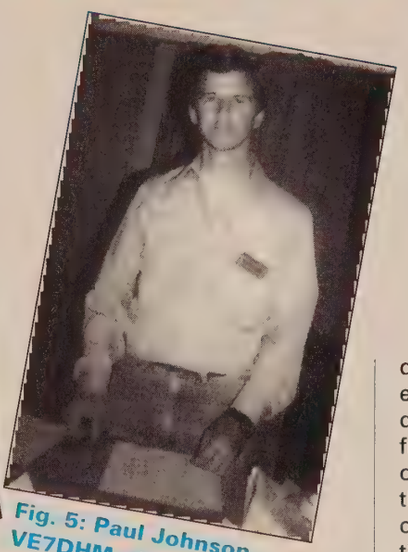


Fig. 5: Paul Johnson VE7DHM, the welcoming committee (and subs collector).

able to withstand temperatures as low as -50°C. The antennas have to be dug out of the snow on occasions too! There are 87 VE7s members of VAPRA, a few from W7, SP5TAO and myself!

After Larry's opening speech, Glenn VE7GCT, pictured in **Fig. 4**, gave a talk on 'Getting Started In Packet'. Glenn is manager of Rogers Cablevision, where VAPRA hold all their meetings.

Paul Johnson VE7DHM, who had been welcoming everybody at the door, gave a talk on using personal mailboxes. Paul, shown in **Fig. 5**, is the treasurer of VAPRA, so I guess he was after membership fees before they had a chance to buy anything!

As mentioned earlier, Brent VE7BD (**Fig. 6**) is a DXer and together with Fred VE7PL (**Fig. 7**) they gave a talk about setting up and using a DX cluster. This raised a lot of interest, since then, Fred has set up a mini-cluster with the latest version of the MSYS system.

Then, Doug Collinge VE7GNU and George Farris VE7FRG (**Fig. 8**) gave a very interesting demonstration of 56kbaud linking. Using full-duplex file transfer, it seemed as fast as using the computer on its own. Several of these high-speed links are now working in Canada.

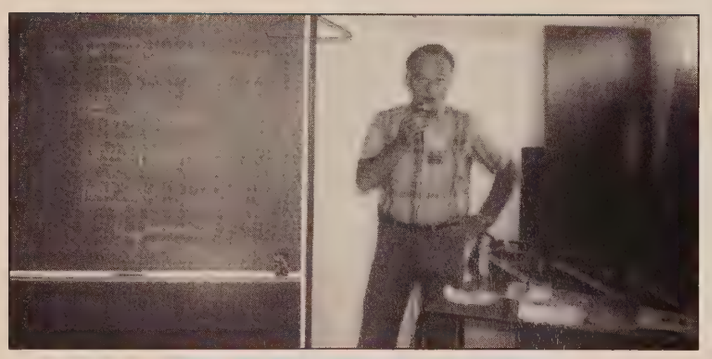
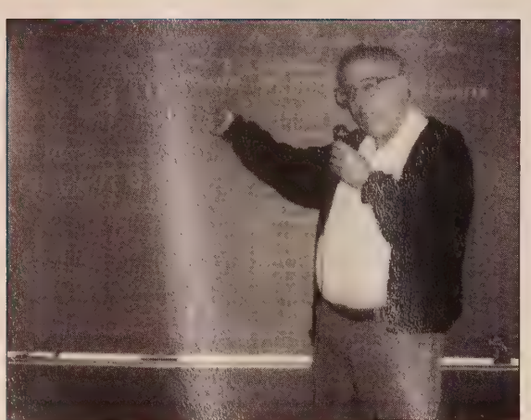


Fig. 6: Brent Ewing in full flow.

Fig. 7: Fred Wyatt VE7PL explaining a DX cluster.



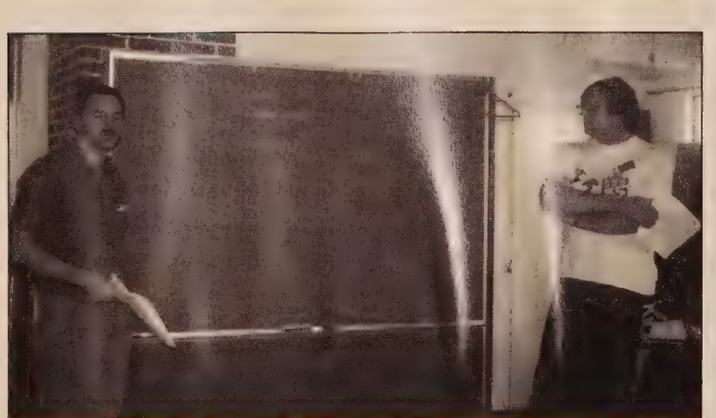


Fig. 8: Doug Collinge and George Farris explaining very high speed linking, at 50kbaud.

## *UK Packet A Joke?*

There was disbelief, when I gave a talk on the packet scene in the UK. They fell about laughing when I told them of the system we have over here. Notices of variation (NOV), site clearances, single-channel working on 144MHz, etc.

I'd been told that the system they have in the USA and Canada was superior, but it wasn't until I saw it for myself, that I could understand quite why. They don't have any of the encumberances we have, nor do they have to apply to use a frequency for any packet operation. If they stay within their band-plan, they can operate as many channels as they need.

On 144MHz they have at least a dozen frequencies in use. I saw a similar number on 430MHz. Full-duplex repeaters are common-place, together with frequency-hopping, like cellular radio, it all helps to avoid collisions and contention.

I admit that they have double the band-space we have, and channel-spacing is 20kHz, but their network is not bogged down in the way that ours is.

Our holiday ended in Vancouver, from where we flew back to reality! If you do get across there for a holiday, you will be made most welcome by the locals, and if you do go, pay a visit to Butchart Gardens, a fabulous place. It's like paradise on earth.

Packet is probably the most rapidly expanding area of the hobby in the americas, and changes are being made all the time. But by self-discipline, and self-regulation they are keeping things in order. This is the way it ought to be here too, with more channels being available, not to mention better frequency planning.

If you feel this way, then please write in support of this with your ideas to Neil Lasher G6HIU, 40 Farm Road, Edgeware, Middlesex HA8 9LT, and let him know. He needs the feedback, or evidence of support for extra channels, so DO IT! Don't leave it for the other chap to do, or until tomorrow, please do it now.

**73 and Happy packeting, Roger G3LDI @ GB7LDI or QTHR. Tel: (0508) 70278 if you have any news.**

# SHORT WAVE MAGAZINE

short wave magazine
AIRBAND SPECIAL ISSUE
Air Traffic Control In The UK
How Aircraft Are Controlled Safely And Efficiently
REVIEWED THIS MONTH
The New Drake R8E Communications Receiver
PLUS
NON-DIRECTIONAL BEACONS
What They Are And How To DX Them
Regular Features
Airband, Scanning, Junior Listeners, SSB Utility Listening, Propagation and Broadcast Enthusiasts

## The UK's biggest, brightest and most readable monthly magazine for the radio enthusiast.

The February issue, now on sale at your newsagent, is an **Airband Special.** Its 84 pages are packed with interesting features for the airband enthusiast, including Air Traffic Control in the UK, DXing Non-directional Beacons, HF Airband Communications and Aero Radiobeacons. On top of all this Godfrey Manning's monthly Airband column appears as usual.

Of course, we have not forgotten those readers who have other listening interests. As well as all the regular columns – Scanning, Propagation, SSB Utility Listening, DXTV Roundup, LM&S, Amateur Bands Roundup, Satellite TV are some of them – there are articles on Televisions for the DXer, the conclusion of the Navtex series and a full review of the new Drake R8E Communications Receiver. The Junior Listener page caters for the younger enthusiast and there is also the lively Letters page.

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# Back-Scatter

## HF Bands

Reports to
Paul Essery GW3KFE
287 Heol-y-Coleg, Vaynor, Newtown, Powys SY16 1RA

As I sit down to write this time, in this part of Wales we have just emerged from fog and icy roads, to wind and icy roads! However, a quick peep on 28MHz says that things aren't too bad, as the band is well open to USA! As for the column, though, most of the usual letters seem to be still buried in the Christmas rush.

If anyone hears or works Aleksandr UA6LHB, would they please contact either GM0EXN QTHR, or drop a line to me, and I will pass the word on. When last heard, UA6LHB was in the Rostov-on-Don area, but contact has been lost for a year.

### Good DXCC News

The backlog of applications at the DXCC Desk is now almost cleared, which ought to please lots of people. The DXCC Desk has now, I understand, received and approved the documentation for the XY0RR operation and so cards may be submitted for credit as soon as they are received.

A major effort by a Russian group in Afghanistan is planned. This means two to three weeks intensive activity around the ARRL CW Contest, with an overall target of some 25 000 contacts.

Via *The DX Bulletin* I hear that Romeo has sent out all his QSLs for the first YA0RR operation (a second is on as I write); and if you don't get yours in a reasonable time, apply again to Box 812, Sofia 1000, Bulgaria. There is no requirement for donations or IRCs. From the same source, I hear that Romeo hoped to get the XY0RR cards printed by the end of the year, so they could be mailed in time to beat a massive Soviet postal increase on 1 January 1992.

The Navassa DXpedition, N0TG/KP1, is on track for January 17-23 at the time of writing, but funds are still sought for the transport bill; donations to N0TG, Randy Rowe, N0TG, 2120 Reverchon Drive, Arlington, Texas 76017.

To offset this, the American/Vietnam effort has, alas, had to go on the back burner for the moment. If licensing problems can be resolved, things may come back on line, but meanwhile all donations are being returned.

The expedition to the South Sandwich Islands is aiming for March. Most operation will be freelance, but towards the end if the pile-ups permit they may come up on s.s.b. nets.

Clipperton Island: this one is aiming for March 1 departure, to arrive by March 8 - if possible they will play in the ARRL SSB Contest that weekend.

### Nauru Non-Starter

The visit by Erik SM0AGD and wife SM0OTG to Nauru was a bit of a non-starter. It seems the Nauru Amateur Radio Club won't open their station for use by licensed visitors, and that short-stay licences for visitors are not granted either.

The station signing ZF1RY was a pirate, as indeed was TF3C; the latter was issued 10 years ago to celebrate 25 years of amateur radio in Iceland, but it was never used by a legitimate Icelandic station.

A rather doubtful one is the character heard signing 1A0KM/I6YO and saying he was aboard a ship! Another one whom seems doubtful is doubt is 3V/DJ8LN, giving name as Peter and QTH Monastir.

Finally, I have a little piece of intriguing news on the Mount Athos situation. It is said all activity from here is suspended until 'ARRL resolves the question of DJ6SI', whatever that may mean. There is also a report that CEPT licences are not valid on Mount Athos according to the Greek Ministry concerned. It sounds to us rather like a sad case of the Greeks preserving a private DXpedition spot!

### The WARC Bands

On the WARC bands this month, **Vince 9H1IP** (M'Scala, Malta) stuck to sideband, and on 18MHz raised SV9ANH, 5V7DP, P4OP, YX5LA, 3B9FR (Rodriguez Is) and J68AM. As for 24MHz, Vince notes 3C1EA, V73AZ, H44QM, C21NI, P4OP, N7PBX in Nevada, KE0QQ in N. Dakota, YX5LA, 9L1US, LZ2VU, W6SAI, ZB2AZ, JT1JA, 6Y5EW, TZ6VV, J68AS, WB8GEX/VP5 and TU4XM.

Turning to **John G3BDQ** (Hastings) I find he has done most on 1.8MHz, but a quick whirl on 18MHz yielded 4J3GM and on 24MHz VQ9QM and YN/SM0OIG.

A shorter than usual letter from **Don G3NOF**, since he was in haste to get his report into the Yeovil post box in time. On 24MHz he booked in AA6TT, CN8NS, HC6OJB, HK5LEX, II5ONU, RY0U, UF6FL, UG6LQ, UO5GQ, V51KC, VP2EHF, YS1RRD, YS/AA4FS, 4U1UN and 6Y5EW.

Now I turn to the Sage of Sheppey, **Ted G2HKU**, who tried keying on 10MHz for UF7FXA, ZL3VN, OE3VP, 18MHz for K0AB and 24MHz for W8KLI, K6RM, J68AS, W6DU, 8P9HT, N4NO, VE1BB and KA9KNX.

A nice card from **G0KDZ** of Thirsk notes his activities on 10MHz; N4VBG/MM off the coast of Bahrein, PJ2/OH6LW, both replying to CQ calls on an apparently dead band; others included UW9YY, JA8CDT, JA0AWF, 7L1JHN, KL7XD, W7EXR, T77C, AD7V, ZS6QU, WY6Z, ZA1TAD, ZA1TAE, VK5FE, UF7FXA, 8P6AU, J68AP, PJ8AD, VK6HD, JR1GMK, OX3BV, OY3QN, ZA1A, ZL3VN, CO2VS, KL7U and ZL4NH.

**Mary G0NZA** (Kirkby-in-Ashfield) looked at sideband on 18MHz and found XO1TX, JH1QVW, UO5GQ, 7X2DG and VK4CEK.

### The 1.8MHz Band

Just as the 1.8MHz band section report was being completed, I heard, via the *DX News Sheet*, that the YUs on Top Band now have more privileges; they now have phone and c.w. between 1850 and 1915kHz, as well as the existing allocation between 1810 and 1850kHz.

Unfortunately, my rig has been quite silent on this band, thanks to other important activities, but at least I have the odd report to hand.

One of the evenings when I was absent from the Powys Net around 1.932MHz was the time when John G3BDQ called in - Sodde's Law at work again! John mentions, apart from the more common European signals, UZ1AWD, RA3DOX, RA3DUT, UA3YCC, UC2W, UC2WAF, UC2OFO, UL7ACI, UL7A, UL0A, RL7A, 4N3IA, SP1PEA, YO3APJ, LZ1KOZ, YL2M, YL2DX, YL2PQ, LY2BTS, LY2ZO, LY2BSS, HA8KX, HG73DX, IS0QDV, 4X4NJ, CT3M, OY6A, EA8EA, K1KI, K1ZM, NX1GB and VE2FU.

The other reporter on this band is Ted G2HKU who kept his sked with ON7BW on sideband, plus c.w. contacts to GM3YEH, GM3YOR, 4N3JA and ON4UN.

The only other reporter for this band is Angie G0HGA in Stevenage, who says that all she worked were either local EU or UK stations.

### The 3.5MHz Band

An odd sort of band, is 3.5MHz. Some very interesting stuff appears on all the usual modes, but in between there is some awful drivel, and worse, some lousy operating. What one does about it heaven only knows.

The c.w. at Ted G2HKU got out to HB0/Y41VM/P, N2RM, XN3EJ, 8P9Z, W1KM, K1AR, K1ZM, W3LPL, KA2AB, W1MK, WA1U and 6W6JX.

Doing some antenna experimenting, Angie at G0HGA found UW9TB, ZB2X, OH0AM, CT3M, plus OK1FDL, UC2LEG, UC2WCJ, OK1MSO, OK3PA, OK3ZBU, UC1OWA, OK1FMB, OK7AA, SP9DTI, SP6FVB, HA5KF, LZ2AJ, YU2SDE, YU4AV, OH3NNC, OZ9AEC, OZ4FT, OZ4UN, SM4CFL, IK1NLW, OZ1CAR, HE7DES and the usual G, F, DL, PA stuff.

### The 7MHz Band

On 7MHz, **G4ITL** (Harlow) notes the forbearance shown to him on 14MHz, but **NOT** on this band - almost every time he tries to have his regular sked with G4XDJ, there is QRM, callers who forget their own callsign, and other such manifestations.

Just one for Ted G2HKU on this band, by way of a c.w. contact with VU2PTT.

At Angie G0HGA, the half-sized G5RV was enough to hook up with RL3L/UW3AO, UA9AKW, UA9XK, W2QW, K1BU, T77GM, RY0N, plus lots of smaller fry.

Another 'just the one' merchant is John G3BDQ, who mentions RH2Y/UA4FDS as his only catch on 7MHz.

Now to **Eric G3LPS** in Blackburn (last time I seem to have inadvertently transposed him to Blackpool!); Eric is another c.w. addict, confining himself very much to 7MHz. Thus, his pickings for this time included UI8IZ, RL5D/UW9YY, 6W6/K3IPK, RH8AQ, AA5DX/MM off the Pacific side of YN and bound for J79, WA6AUE, NB6U/7, W7ZQ, 4X1NM, KP2/OH6ZS, EA6/N6RA, ZK2KF, RL0L. In CQ WW, 6V6U, JW8XM, CT3M, J6DX, RH0E, LU4FM, TK5C, VP2EI, PJ9A, 8P9Z, NP4Z, NL7G, 5U7M, HI8A, 7Z1AB, C42A, TI1C, 7Q7TT, C56N, EA9EA and UZ0QWA. Post-contest, UA0SSA, W7SX/6, K6DC, the first two long-path W6s of the season, at around 1500Z on November 30, W7XR, HB0/Y41VM/P, J68AN, W7SX/6 again, N7MC, UA0QEU, 4J8GWS, 5B4ADA, VK3RP, 8P6AU, UA0XAO, W6YA, K6DC, RF6QA, WA7NIN, J37ZF, JR1CFG, K7OXB who called Eric from Utah but was lost in QRM, WA6BMB, and W6OV in Idaho. As a late flash, G3LPS notes that he did make it in the end to K7OXB, to give him a 'full house'

of W7 states worked, long path on the vertical antenna.

### The 28MHz Band

On 28MHz, G4ITL tried a Delta loop element which he reckons is the best antenna he has ever had. On this band recent contacts for Bernard included (c.w.) LU5DON, LU2EPN, KB5AWV, K5POW, 9J2BO; (FM) LA0QG; and s.s.b. with LU7FJD, 9Q5TE, PJ8AD, EA1FBJ/MM off the Ivory Coast.

Looking at the list from Ted G2HKU we find he used the main rig to key with TP0SP, KI4XO, 8P9HT, UA9MA, 4X4VF, UA90A, VU2BK, ZY5EG, W3LPL, W3BGN, K1AR, ZS6BCR, P40W, C56/G4ODV, C56/GM3YTS, W4XJ, K2QAR, 6W6/K3IPK, J5AUA, VE4MF, KU0J, W1HX, K4KQ, WX8Q, W2BA, WB6FKR, N4DR, WS9T, while the q.r.p. netted W3ARK with just four watts.

Angie G0HGA offers her c.w. with C56/G3SXW, C56/N7ZE, HK5M, P4/N7NG, 6W6/K3IPK, P40W, J6LSC, RO5OL, KR8V, K4DZM, WA8YWK, K3MQH, KG9N, WB4QNP, WB3GOC (a YL), W4XJ, VE3ORF, VE1AYY and assorted smaller fry.

John G3BDQ gave 14-year old novice KC4WNL his first contact with G, and also connected with CU2BQ, EA8BTA, J68AS, VEs and W stations.

Now we turn back to Don G3NOF, who is all s.s.b. and raised EL2CI, FY5FJ, JX9EHA, KA7DLS, VA1S (a VE special), VE7CVM,VE7DGI, VP25EI, VP5VEV, UH6W/UA4FFG, XX9AW, 5V7JG, 9K2TC and W4WFL for a mutual friend of earlier years.

Mary G0NZA stuck with the sideband too, for contacts with WP4EPC, 9H4L, VP25EI and VE3MVP.

### The 14MHz Band

The 14MHz band is where it all happens! G4ITL keyed with VK5QJ and PY3AVF, to save his voice for the contact with ZL4AN.

The happenings so far as Ted G2HKU were concerned were the c.w. contacts out to PJ9A and UA0QEU.

Also busy on c.w. was Angie G0HGA, and she worked 6W6/K3IPK, FF0XX, CU2AFT, W5XJ, EA8EA, 4K4/UA6LCG, UK0MO, 4K3OLL, UL7BJ and UH8AG in Tashkent, plus the usual Ws and Europeans.

Activity on 'Twenty' for John G3BDQ was a small matter of UO5OOT, W7KT (Seattle) and ZA1TAH.

When Eric G3LPS could tear himself away from his beloved 7MHz, he tried a whirl on 14MHz c.w. with JY8VJ, RL0L, ZA1TAG, VK6WT, CU7C, K7QQ, J6DX, NN7R, NL7G, K7ENA, P40V, ZY5CW, V47NAM, W6BA and K3EST/6.

Our first s.s.b. op on this band is Don G3NOF, who spoke to AP5HQ, EA6BC, GJ4TXB, KH2FI/MM, UM8TBE/RM6P, VK5QW, VU2KFC, 3B8FA, 5H3DC, 5Z4FM and 9K2KW.

### The 21MHz Band

On 21MHz, Ted G2HKU gets first crack this time, and reports he worked J6DX, P40J, ZW5B, K1AR and UH8BBU, all on c.w.

Harlow-based G4ITL tried the band on the odd occasion, and pulled out VK2KHD, YB2FRR, PY4PZ (c.w.), BY5RCS and HL9AA.

Angie G0HGA keyed with HK5M, C56/GM3YTS, N3JT, WB3GOC, RL0L, RX3ADI, RD8DYL, UH8YM and U0AL.

For his h.f. activity, John G3BDQ prefers 21MHz; c.w. made the grade with ZF2PG/ZF8, VP25EI, 4K1B, VK4EAW, VU2BK, PZ1AW and J68AM, while s.s.b. did the trick with VP8CIB, EC6NU, J6LRU, VK2FMW and VY2RO.

The telephony of Don G3NOF was returned by EA9UA, HR1LW, J37NL, J37ZA, J39AL, KB5KYO/P (IOTA NA 168), RD85ODZ, TZ6VV, VA1S, VK1PJ and VK3EEZ.

Finally, Mary G0NZA who chatted to J37FR, 9K2IC and CX7BC.

### Deadline

That's it for another month. Deadlines for next time will be February 20 and March 20 to arrive, mailed to the address at the top of the page. Meanwhile, have fun!

# Back-Scatter

## VHF Up

Reports to
David Butler G4ASR
Yew Tree Cottage
Lower Maescoed, Herefordshire HR2 0HP

### Solar Data for December 1991

During the last week of November the solar and geomagnetic levels remained quiet with no flares of any type being reported, but by December 1 the active side of the sun had rotated into view causing an increase in solar flux levels. The active area, solar region 6952, became increasingly magnetically complex producing 15 M-type flares between December 1-8. Major flares occurred on December 3 at 1639UTC, December 8 at 2316UTC and on December 9 at 1354UTC.

The event on the 3rd consisted of an X2.2/2B flare lasting 53 minutes, together with a ten flare measuring 1200 flux units. A considerable increase in flare activity occurred during the period December 9-15 with 28 M-type flares being reported, although most of them were of a small magnitude.

The solar flux levels increased from 172 units on December 1 up to 260 units by the 10th whilst the geomagnetic A index declined from 14 units on the 2nd to only three units on December 7, the lowest daily level since February 1991. It was also at a low of four units on December 15, but on December 17 it reached a monthly high of 27 units, causing a weak auroral opening on the v.h.f. bands.

### Results And Forecasts

Fantastic! Great! Worked all continents in three hours! The band was in tremendous shape with openings nearly every day! That was how I recorded events happening on the 50MHz band during February 1991, and it would be unrealistic to suggest that it won't happen again around the same time this year.

In February 1991 propagation was especially good to Oceania and Africa, although there were some openings to Asia, North and South America. The excellent conditions continued through into March allowing many stations to contact Australia, Philippines, Guam, Argentina, Uruguay and Brazil.

The optimum time to hear signals from DUJA, KG6 and VK, is between 0900-1100UTC and normally occurs on the day you have to go out shopping! Some of the regulars to look out for include KG6DX (QK23), KG6UH/DU1 (PK04), VK3OT, VK6PA (OG89), VK8GF (PG66) and VK8ZLX (PG66).

It will be highly unlikely for those in the UK to hear New Zealand on the 50MHz band, but it's worth remembering that DK2EG (JN59) heard ZL0AAA (RF65) at 0821UTC on February 11! It is very likely, however, that auroral propagation will be prevalent during the period, effecting all bands up to 144MHz and possibly higher. It may be worthwhile listening to the auroral warning beacon DK0WCY on 10.144MHz. It transmits one of three messages, 'no aurora', 'weak aurora' or 'strong aurora'.

### Auroral Events

In the March 1991 edition of *PW*, GM4CXP, referring to events prior to December 1990, summed up the conditions by reporting "still no auroras...it's enough to drive a GM to drink!" Fortunately that state of affairs completely changed in January 1991, and for many DX operators, c.w. or s.s.b. contacts could be made on the 144MHz band at distances up to 2000km during every month of the year.

Auroral conditions during the first three weeks of December however, were not very good, most openings being very brief, weak and only reaching the 50MHz band. The only report received of a 144MHz opening, came from G8GXP (IO93) who detected the Lerwick beacon GB3LER on 144.965MHz fully auroral at 2015UTC on December 10. Openings were much more prevalent in November, and reports are still coming in of the large scale event on November 8-9.

**Richard Girling G4FCD** (IO91) reports that the opening on the 8th was so good on the 144MHz band, that he chose to work it on s.s.b. Between 1900-0200UTC he made 66 QSOs with 14 countries, the best DX being IK1EGC (JN35), I3LTT (JN65), SP2NJI (JO92), SP3MFI (JO91) and SP9EWO (JO90). Richard also listened on the 430MHz band but didn't hear any signals.

**Mark Holloway G4YRY** (IO90) worked a number of c.w. stations on the 144MHz band, including HB9BHU (JN37), I1DMP, I1JTQ, IK1MTZ, all in JN35, OK1FGA (JO80), OK1HAG (JN79), SP2MKO (JO83), SP4MPB (KO03), SP6GVU (JO81), SP7EBM (JO91), LY2BFR (KO15) and UZ2FWA (KO04).

**Dave Ackrill G0DJA** (IO93) also caught the opening on November 8-9 contacting, on the 144MHz band, DJ2QV, F6DWG, GI4KSO, PA3COB, PA3FPQ and PA0RDY. Not bad considering that Dave was only running 3W into a 9-element Yagi! He found that his best tactic for raising stations was to add 'QRP' after calling them, otherwise they wouldn't work him. He also called stations in EI, HB9, LA, ON, OZ and SP but couldn't attract their attention.

### Meteor Scatter

**Geert, ex-ON1CDQ**, passes on the news that he has recently upgraded his licence and now has the callsign **ON4GG**. Located in JO20BU, he is interested in trying some meteor scatter tests on the 50MHz band, using s.s.b. or high speed c.w. up to 1000 letters-per-minute (l.p.m.).

Although any sked is welcome, he is especially looking for partners in the following UK locator squares; IN79, IO66 and JO03. In the Irish Republic, he requires IO53, IO54

# Back-Scatter

and IO62. Geert runs a Yaesu FT736R, 10W and a pair of stacked 8-element Yagis. He can be contacted via packet radio, ON4GG @ ON6AR.BEL.EU.

**Dave Law G0LBK**, is looking for an audio keying circuit to enable high speed c.w. to be used with his m.s. system. Similarly, he wonders if any readers have modifications to enable the FT707 transceiver to key at high speeds?

### *Moonbounce*

Over in Germany, **DL5MAE** is actively using moonbounce on the 144MHz band with a 136-element array, consisting of eight 17-element Yagis. The picture, **Fig. 1** shows his antenna farm, consisting of three towers supporting h.f. and 144MHz beams.

**Michel Winiger HB9RCI**, is fortunate to have, not one, but two e.m.e. systems. On the 144MHz band he runs a Yaesu FT726R, a 4CX1000A amplifier and eight 17-element M2 Yagis. On the 430MHz band he uses the FT726R, a YD1334 amplifier developing 1200W output and eight 39-element M2 Yagis, each with a boom length of 13 wavelengths. Michel is interested in schedules on either band, anytime between 2100-0900UTC. You can contact him at Hotel Loewen, 6025 Neudorf, Switzerland, or you could telephone him on 010 41 45 511140 or by Fax 010 41 45 513858.

**Herve F1HRY**, operator of the well known F6KSX e.m.e. group, reports that activity on the 430MHz band is growing rapidly in France. During the ARRL contest held in October and November 1991, eight French stations were active, each with a system capability equivalent to that of 16 Yagis! Active stations include F1ELL and F6CGJ, both using 8m dishes, F2TU with a 6m dish, F1FEN and F1FHI with 16 DJ9BV Yagis and F6KSX, F8SQ and F9FT, each using 16 F9FT Yagis.

### *Maritime Moonbounce*

The tidal waters of Christchurch Harbour (IO90) were the setting for what is claimed to be the first e.m.e. contact on the 144MHz band from a motor launch. The impromptu attempt, by **Mark Holloway G4YRY** and **Graham Peyman G0KON**, took place during the weekend of the ARRL e.m.e. contest on November 23, and it seemed to be an ideal opportunity to make a random contact off the moon, especially as the weather forecast was very favourable. They boarded the launch, shown in the photograph, **Fig. 2**, at 0500UTC, having previously set up the antenna system of four 9-element Yagis and a 250W amplifier and set off into the bay. Fortunately, the calm sea enabled a perfect anchorage to be found and, with the antennas pointing towards the western horizon, they awaited moon set. At 0730UTC, W5UN was heard peaking 529 and then became a consistent signal as high tide approached. Contact was

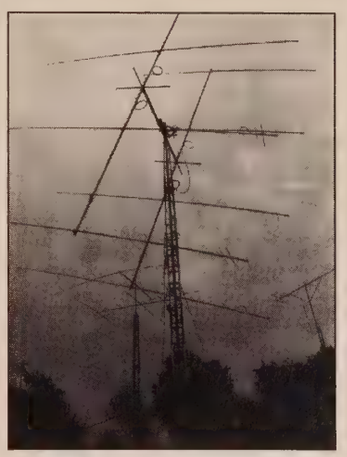

**Fig. 1: The 144MHz array at DL5MAE.**

made with the Texan station at 0804UTC, although at first he thought they were mobile, but after a few overs returned with the call-sign G4YRY/MM and 0 reports. History was made!

A little later, at 0822UTC, a QSO was completed with SM5FRH, despite heavy wash from other craft which changed the antenna elevation angle from 0 to 45° every few seconds! Other stations heard but not worked were DL8DAT, I2FAK, N1BUG, K2GAL, KB8RQ and W0HP. They both made another attempt at moonrise, 1730UTC, but e.m.e. conditions had deteriorated and no other stations were worked. Mark G4YRY reports that this little venture doesn't prove anything, but it was very enjoyable. I guess that's what it's all about!

### *The 50MHz Band*

Band conditions on 50MHz were very poor during the first two weeks of the December. Apart from TU4DH and the beacons ZD8VHF and 9L1SL being heard on December 1, nothing else was reported until December 13 when some W1s and VE1's were briefly heard around 1645UTC. On December 15 there was a short opening across the Atlantic, with HC1BI and VE1YX being heard from 1400UTC. Later in the day, from 1600UTC, Sp-E propagation allowed many operators to work into CT, F, I, OE, YU and 9H. The opening also coincided with the first day of 50MHz operation from Czechoslovakia and at 1730UTC, OK2PZW was heard doing tremendous business.

There were two good openings to North America on December 15 and 16 with many W1 and VE1 stations being worked between 1445-1600UTC. An aurora on December 17 wiped out the transatlantic path for the day, but it later recovered to give weak openings into W1 and VE1 on December 18, 19 and 20. A number of DX stations, including HC2FG, KP2A, P43FM and YV5ZZ were worked between 1230-1330UTC on December 21, the opening moving to W1 around 1500UTC.

**Gerrard 5V7JG** became QRV from Lome, Togo (JJ06PE) in September of last year and expects to finish his operation at the end of February 1992. He is using an FT736R, 25W and a 5-element Yagi and within the first week had worked 3 continents, 20 countries and made over 300 QSOs into Europe. His home call-sign is F2JD, but QSL cards go via his manager J. Duthilleul F6AJA, 515 Rue du Petite Hem, Bouvignies, F-59870, France.

**Dave Heil ex-J52US, ex-9L1US**, has left Sierra Leone and will reappear from Botswana during February. He will be operational from the capital Gaberone (KG25) with at least 160W and a pair of stacked 5-element Yagis.

The Lithuanian club station LY2WR, has recently been granted an experimental licence, allowing access to the 50MHz band until April 1992 when it will be reviewed. Because of concerns to interference to channel R1 television, the club is the only LY station to be given permission. They will be using an Icom IC726, 10W and a dipole. Let's hope we get some Sporadic-E soon!

Last month I reported that, from December 15, Czechoslovakian A and B class radio amateurs have been given permission to operate on the 50MHz band. Tony OK3LU, President of the national society CSRK, passes on the news that they have been allowed access to the band 50.000-52.000MHz with a maximum power of 20W to a horizontal antenna. Mobile operation is not allowed. Stations active at the beginning of 1992 include OK2PZW, OK3CGX and OK3LQ.

Although Asia is probably one of the more difficult continents to work from the UK, it is fortunate that three DXCC countries, 4X, 5B4 and ZC4, are within Sporadic-E range. Information received from Adrian McGonigle G0KOM, ex-ZC4MK, reports that several stations in this area are now QRV on the band, including 4X1IF, 5B4JE, 5B4TX, 5B4YV, ZC4AB, ZC4DG and ZC4KS.

Another country in the middle east within Sp-E range of the UK is Lebanon, but although the 50MHz band is available to class A amateurs, there is no one QRV at the present time. Samir OD5SK is interested, and he plans to be active later in the year when a transverter arrives from Germany. He will use it with a Trio TS-440S, but needs to construct a beam antenna before coming on the air.

**Fig. 2. Shown here are G0KON, G4YRY and daughter preparing the launch for the 144MHz maritime mobile e.m.e. trip.**

### *The 144MHz Band*

During the first few weeks of December a large anticyclone persisted over the UK. It provides some good tropospheric conditions on the v.h.f. u.h.f. and microwave bands, allowing operators in central and southern England to make QSOs with stations in HB9, OE, OK and SP.

Some stations also reported working LA0DT/MM and PA/GW7EKS/MM, both located in the North Sea whilst, on December 8, G4YRY (IO90) found the southerly path to EA1BCB (IN63) open.

### *The Microwave Bands*

What is claimed to be the first ever 47GHz QSO made in the UK, was accomplished on August 16, when **Brian Hummerstone G3HBR** worked **Arnold Mynet G3HBW/P** over a distance of 3m in Brian's back garden. This UK record was then comprehensively broken 35 minutes later, when the distance was increased to 33m!

The first 'real' contact however came on August 21 when G3HBR/P worked G3HBW/P over a path length of 11km, to be extended later in the day to a distance of 13km. Signals were 55/59 with some slow fading, all contacts being made on two frequencies, 47.070GHz and 47.178GHz, two-way simplex, with a common 108MHz i.f. The equipment used to make these historic QSOs consisted of a 50mW cavity, stabilised MA49193 Gunn diode transmitter, into a 42cm cassegrain dish, with a double-balanced mixer feeding a wide band f.m. receiver.

Dave G0DJA reports that he has moved QTH to Wakefield, West Yorkshire and has only recently managed to get operational again. On the 10GHz band he is running a 5mW Gunn diode transmitter into either a 40cm or 60cm dish, with an in-line mixer diode feeding a 10.7MHz i.f. receiver. Dave is also modifying a commercial c.w./s.s.b.

# Back-Scatter

narrow band transverter which should give 250mW output and low noise 10GHz receiver when completed. On the 24GHz band he is running a 5mW wide-band f.m. transmitter and an in-line mixer into a 40cm dish.

### VHF News

The RSGB will be holding its 1992 VHF Convention on Saturday March 14 at Sandown Park racecourse, Surrey. In addition to the trade exhibition, specialist groups and equipment test facility, a full lecture programme has been arranged. Further details can be obtained from Geoff Stone G3FZL, on 081-699 6940. If you can make it, there will be a meeting of v.h.f. DXers, upstairs, in the Bear Public House, Esher, virtually opposite the entrance to the convention, on Friday March 13 at 8pm. I'll see you there!

If you want to plan ahead, and also maybe make a holiday out of it, it is worth noting that largest v.h.f. meeting in Europe is being held in Weinheim, Germany (JN49), on 18/19/20 September, although this date is very much subject to confirmation. The photograph, **Fig. 3,** shows a small part of the antenna farm at the DL0WH club headquarters, location of the camp site, and night time social gatherings!

**Fig. 3: Antenna farm at DL0WH club headquarter, Weinheim in Germany. Photo by G4VXE.**

### Happy 30th Birthday OSCAR!

Did you know that the first OSCAR amateur radio satellite was born on 12 December 1961? OSCAR-1 was a 100mW telemetry beacon operating on 145MHz, but despite the low power, was heard by over 570 radio amateurs in 25 countries all over the world. The last signals were copied on 3 January 1962, and finally, on January 31, OSCAR-1 burned up on entering to the earth's atmosphere.

### Jamboree On The Air

In October, I played host to Cub Scout packs from a number of villages in Herefordshire, allowing them to contact other JOTA scout groups and to help them obtain their Communicators badge. The venue was the club station at Madley Communications Centre near Hereford, and although I couldn't allow them to use the gigantic 32m dishes located on site, they were able to use the h.f. 50MHz and 144MHz bands to contact other groups.

The picture, **Fig. 4,** shows a group of cub scouts from the Clehonger and Kingstone packs outside the G7BTI ham shack. On February 22, I will be helping the Ewyas Harold Girl Guide and Brownie packs with their 'Thinking Day on the Air', the YLs equivalent of JOTA. If you hear them on the air please call in. They would also appreciate getting packet radio messages. You can send packet via G4ASR or G7BTI @ GB7TCM.

### Award News

The following awards, issued by the Malta Amateur Radio League, are available to any v.h.f. operator who can satisfy the basic requirements. The Dip-Med Award can be obtained by working five of the following 26 Mediterranean countries, and must include a contact with the Island of Malta; CN, EA, EA6, EA9, F, I, IS, IT, OD, SU, SV, SV5, SV9, TA, TK, YK, YU, ZA, ZB, ZC4 or 5B4, 3A, 3V8, 4X, 5A, 7X and 9H.

The 9H Diploma requires the applicant to collect 10 points, five if outside of Europe, at the rate of one point for a 9H and two points for a 9H4 or 9H1MRL, the Malta Club station. For either award send 12 IRCs, £2 or US$2, (15 IRCs, £3 or US$3 to applicants outside of Europe), along with a certified list of QSLs by two amateurs to Walter A. Gatt 9H1DU, MARL Awards Manager, PO Box 575, Valletta, Malta.

### Expedition Update

There is still a chance to work P43FM operating on the 50MHz band from the Netherland Antilles. He will be there until the end of March, and cards can be sent via his home callsign PA0FM.

Australian amateur VK0KC, will be QRV from Casey Station, Antarctica (OC53), for a three to four week period commencing March 1.

Bill Wiseman KM1E, will be operating on the 50MHz band during March from the Bahama Islands with the callsign C6A/KM1E. The QSL route is via his home address, PO Box 120, Woolwich, ME 04579, USA.

The expedition to the South Sandwich Islands, which was mentioned last month, is still running to schedule and should take place between March 21 and April 4. The operators are flying out from the RAF base at Brize Norton, on March 9, to arrive at Port Stanley, Falkland Islands, on March 10. The group will then transfer to the research vessel, the Abel-J, which will set sail for the South Sandwich Islands on March 14, arriving seven days later. The equipment, originally loaded aboard the Abel-J in October 1991, will then be unpacked and the h.f. 50MHz and 144MHz e.m.e. stations set up.

Between April 20 to May 22, G3JVL, G3SED, G4CCZ and G4CVI, will be in Guyana (8R1) as part of the team responsible for the Camel Trophy Rally communication systems. Whilst there they will operate on the 50MHz band, 24 hours a day.

The expedition will also include ten days of operation from PP8. Both of these events are related to the rally, which involves bashing through 1800km of rain forest with 40 Land Rovers. In October 1991, G4CCZ and G4CVI made a preliminary visit to Guyana and managed to work 41 countries, using the callsign 8R1/G4SMC. I will give further details of this expedition in the next issue of *PW*.

**Annual c.w. ladder**

| | Band (MHz) | | | | |
|---|---|---|---|---|---|
| Station | 50 | 70 | 144 | 430 | Points |
| G4ASR | 48 | 49 | 335 | — | 432 |
| G4OUT | | 48 | 220 | | 268 |
| G0FYD | 10 | | 37 | | 47 |
| G0EVT | 17 | | 11 | | 28 |
| GW4VVX | | | 11 | — | 11 |
| GM4CXP | | 1 | 6 | | 7 |

Number of different stations worked since 1 January 1991

### Beacon and Repeater News

After some years of inactivity, the ZB2VHF beacon is once again QRV on 50.035MHz. Located in IM76HE, it is running 30W into a 5-element Yagi.

To fall in line with changes made to the 70MHz band plan in early 1991, the beacon GB3ANG has been taken off the air in preparation for its move to 70.020MHz. The original plan was that GB3BUX will operate on 70.000MHz, GB3REB on 70.010MHz, GB3ANG on 70.020MHz and GB3MCB on 70.025MHz. It should be noted that most of these changes are still in the initial stage, and that any move must await licensing formalities to be completed beforehand.

A Swedish beacon SK3VHF, has recently become QRV on 144.940MHz. The beacon runs 500W e.r.p. from an antenna beaming due south from JP73HF, and sends its callsign and other information at a speed of 1000 l.p.m. Obviously, this is one for the meteor scatter enthusiast! Another Scandinavian beacon, LA3VHF, also transmits high speed c.w. information. It runs 150W e.r.p. from a 16-element Yagi beaming south from JO38RA, and can be found on 144.880MHz.

A special polar mesosphere beacon that you may hear via aurora, is SK2VHH operating on 144.9825MHz. It runs a massive 15kW e.r.p. from an antenna system beaming n.n.e. from locator JP94.

The microwave beacon GB3CLE is operational again on 1296.910MHz, running 2W into a 10dB gain Yagi beaming north from Brown Clee, Shropshire (IO82RL). The beacon keeper Don Goddard G3UQH, hopes to increase the power when he finds time, but in the meantime he would appreciate reports of the beacon in low power mode.

### QRZ Contest!

The RSGB 70MHz cumulatives are being held between 0900-1100UTC on February 23, March 1 and 15. The contest exchange consists of RST, serial number, locator and QTH. The annual 70MHz fixed station contest will be held on March 29.

An RSGB 144/430MHz contest will be held over the weekend of March 7-8. The German AGCW-DL 430MHz c.w. contest will be held on March 23 between 1900-2300UTC. There are three sections relating to power output; A = less than 3.5W, B = less than 25W, C = more than 25W output. Participating stations, who must only use the band 432.010-432.150MHz, should call "CQ AGCW TEST" and exchange RST, serial number, power class and locator, for example; 599001/C/IO81M.

The last in a series of microwave cumulative contests, for all bands from 3.4GHz and up, will be held on February 16 and March 16. Although the aim of these sessions is to encourage fixed station operation, portable stations are most welcome to participate.

Scandinavian activity contests will be held between 1800-2200UTC on the following dates,

**Annual v.h.f./u.h.f. table January to December 1991**

| Station | 50MHz | | 70MHz | | 144MHz | | 430MHz | | 1296MHz | | Points |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Counties | Countries | Countres | Countries | Counties | Countries | Counties | Countries | Counties | Countries | |
| G6HKM | 61 | 55 | | | 74 | 24 | 40 | 11 | 33 | 7 | 305 |
| G4FCD | 27 | 22 | | | 85 | 18 | 56 | 13 | 34 | 5 | 260 |
| G0NFH | 44 | 25 | 30 | 7 | 61 | 17 | 43 | 11 | 13 | 2 | 253 |
| G8ESB | 7 | 6 | 20 | 5 | 85 | 14 | 45 | 8 | 14 | 5 | 209 |
| G8ASR | 1 | 52 | 50 | 9 | 55 | 28 | | | | | 195 |
| G4LDR | 24 | 20 | 10 | 2 | 56 | 14 | 36 | 5 | — | — | 167 |
| G0FYD | 12 | 38 | | | 72 | 29 | | | | | 151 |
| G8PYP | 17 | 40 | 1 | 1 | 47 | 21 | 19 | 4 | | | 150 |
| G0EVT | 13 | 29 | | | 37 | 18 | 14 | 6 | | | 117 |
| GW7EVG | | | | | 47 | 8 | | | | | 55 |
| G1THG | 8 | 11 | | | 23 | 9 | | | | | 51 |
| G7CLY | | | | | 38 | 10 | | | | | 48 |
| GM4CXP | 2 | 1 | 2 | 2 | 22 | 3 | | | | | 32 |

50MHz on February 25 and March 24, 144MHz on March 3 and April 7, 430MHz on March 10 and April 14, microwaves on February 18 and March 17. A full set of rules can be obtained from me on receipt of an s.a.e.

### Deadlines

Please send your letters to reach me by the end of the month. I always write up the column in the first week of the following month. Don't forget that I can also receive messages via packet radio at my mailbox GB7TCM, and I can also be contacted at my DX cluster GB7DXC.

Photographs of your shack, antennas or any v.h.f. activity are especially welcome. Other pictorial items such as QSL cards, awards, certificates, etc., are also required. They will all be returned to you.

**144MHz QRB Table**
**Top distances (km)**

| | | |
|---|---|---|
| **Tropo** | **3160** | **GM4YXI** |
| **Aurora** | **2143** | **G4YTL** |
| **Sp-E** | **3080** | **G0EVT** |
| **Meteor** | **3100** | **GW4CQT** |

*Fig. 4: Clehonger and Kingstone (Herefordshire) Cub Scouts visit the G7BTI shack for Jamboree on the Air.*

# Back-Scatter

## Broadcast Round-up

Reports to Peter Shore via the PW Editorial Office

With the Soviet Union now no more, the radio scene in the republics which formed the old Union is poised to become very interesting. Radio Moscow has been suggesting on the air that it is to be reorganised. That is likely to mean a significant reduction in the number of languages the station broadcasts - presently around 60 - probably concentrating on a core of the most widely spoken tongues coupled with a cutback of the number of frequencies used to transmit each service. These moves will be forced on the station by economic reasons as much as political, since the cost of running the enormous number of transmitters will rise following the freeing of prices in Russia and some other republics.

Meanwhile it will not be too long before we discover whether republics such as Lithuania, which maintains an overseas service, will continue to benefit from the use of transmitters in other republics, or if the cost becomes prohibitively expensive. Matters are in a considerable state of flux and are likely to be so for some weeks yet as the old administrative apparatus is wound down and new authorities take control. Perhaps congestion of the short wave bands will be wiped out overnight?

Deutschlandfunk, Germany's European station, will soon be absorbed into Deutsche Welle: at the same time DW plans to become more active in television. The DW service already has a TV production facility and produces German and other language programmes for stations around the world to rebroadcast free of charge.

Radio Vilnius has reported its return to the old broadcasting centre, from which it was forcibly removed on 13 January 1991 by Soviet soldiers. The station is somewhat short on telecommunications equipment, but it does have one contact number for telephone and FAX: it is Vilnius 660526.

Radio Moscow's most boisterous presenter, Vasily Strelnikov, appears to have been sacked. He had a weekly programme, *Vasily's Weekend*, which could be described as the most dynamic on the station, and in recent months could also be heard from time to time on Radio Netherland's *Media Network* programme. Towards the end of December, Strelnikov's last programme was heard over Moscow. Will he return to the airwaves? Perhaps he could get a job at Radio Netherlands!

A Congressional investigation into US foreign broadcasting has published its results. Up for discussion, was whether all US broadcasting could be amalgamated into one organisation. The taskforce has recommended that VoA and RFE/RL should remain separate, since their respective missions are quite different. The taskforce suggested that VoA should concentrate on international and national news, whilst Radios Free Europe and Liberty offer the sort of programming which citizens in the former East Bloc countries would really want to have in their own countries. It is thought that both RFE and RL have a role for the rest of the 1990s. A new recommendation is for the formation of a further station, Radio Free Asia, beaming towards China, North Korea and some other Far Eastern countries with less than liberal regimes.

Before launching into this month's listening news, don't forget that I welcome all your frequency information and other news. Send it into the *PW* Office for publication in 'Back-Scatter'.

### European Stations
### All times GMT (=UTC)

The Voice of Turkey's English language service can be heard daily:

2100-2200 on 9.445MHz
2300-0000 on 9.685 and 7.185MHz

The civil war in Yugoslavia may be subsiding following the latest UN sponsored peace accord, which took effect in early January. The media scene is nonetheless interesting. Croatian Radio is heard on 9.83 and 6.21MHz from around 1900 overnight. The English service of Radio Yugoslavia from the capital, Belgrade, is now heard at 2200 on 9.505 and 6.10MHz.

### African And Middle Eastern Stations

The Voice of America has now inaugurated its new transmitting plant in Botswana - hurriedly advanced following the closure of its Liberian station - and the schedule for English to Africa is:

0300-0500 on 7.265MHz
0300-0430 on 11.94MHz
0430-0500 on 15.37MHz
1600-2200 on 15.445MHz

The Botswana station is very small, with just two 100kW transmitters and curtain antennas.

We've reported that Kol Israel's schedule has regained some of its former strength with the resumption of relays of the domestic English services. A reminder that English can be heard:

0500-[illegible]15 on 11.588MHz
1100-1[illegible]0 on 17.545MHz
1430-14[illegible]3 on 17.59, 15.64, 11.605 and 11.58[illegible]MHz (not Friday, Saturday or Jewish Holy Days)
2000-203[illegible] on 17.575, 11.675, 11.605, 11.5[illegible]7, 9.435 and 7.465MHz
2230-2300 on 17.575, 11.675, 11.605, 11.587, 9.435 and 7.465MHz

The English service from Jerusalem has a *DX Corner* each Sunday evening at 2000 repeated at 2230 and *Calling All Listeners* is heard at 2230 on Mondays. Regular frequency announcements are carried on Thursdays during the 2000 and 2230 transmissions.

### Asian and Pacific Stations

All India Radio's latest schedule lists English to Europe:

1845-1930 on 11.86 and 9.95MHz
1845-1945 on 15.08, 11.935, 11.62 and 7.412MHz
2045-2230 on 15.265, 11.715, 11.62, 9.95, 9.91 and 7.412MHz

Radio New Zealand's present English language service operates:

2200-0800 on 17.77MHz
0800-1210 on 9.70MHz
1800-2210 on 15.12MHz

Radio Pakistan continues to broadcast its service of dictation speed news to Europe daily at 1105 on 21.520 and 17.9025MHz (what a strange choice of frequency). The same frequencies carry normal news bulletins at 1100 and at 0800, whilst in the evening at 1700 there is an hour-long transmission on 15.55 and 11.57MHz.

### North, Central And Southern American Stations

Radio Havana Cuba is holding its 29th international contest with five first prizes of an all-expenses paid, two-week visit to Cuba, visiting schools, hospitals, farms, factories, tourist spots and historical sites. To enter, write an essay on the theme "How has Radio Havana Cuba contributed to the process of unity and identity among the peoples of Latin America and the Caribbean". Entries should be sent by 30 April 1992 to Radio Havana Cuba, PO Box 6240, Havana, Cuba. The station seems to be difficult to hear in Europe - if you've managed to receive it, please send the frequencies and times to me at the *PW* Office in Poole and we'll put you into print!

# *TWO NEW KIDS ON THE BLOCK.*

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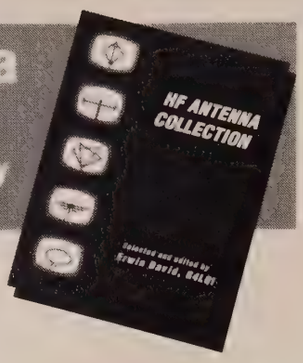
Selected and edited by Erwin David, G4LOI

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Martyn Croft, G8NZU

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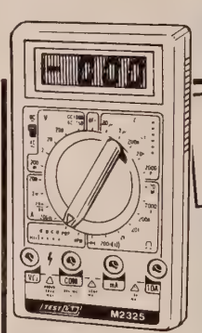


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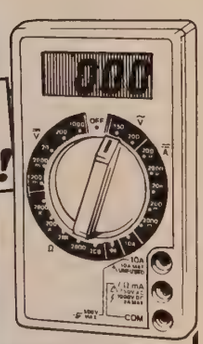

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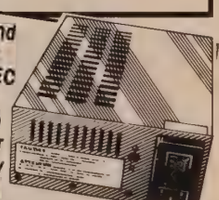

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| | |
|---|---|
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| Output impedance: | 1.5kΩ |
| Frequency response | 150Hz to 8.5kHz |
| Transmission time-out circuit | Five minutes approximately. |
| Power supply: | 12V d.c. from vehicle or transceiver supply. |
| Current consumption: | 20mA (receive) 55mA (transmit) |
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Complete both coupons, in ink, printing your name and address clearly in block capitals. Coupon (2) will be used as the address label to despatch your antenna to you. Send the coupons, with your cheque, to: PW Special Offer (March), FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP. If you wish to pay by credit card (Access, Mastercard, Eurocard or Visa only), please fill in your card details and sign the coupon where indicated. Offer only available to readers of *PW* in England, Scotland, Wales, N. Ireland, the Channel Islands, the Isle of Man and BFPO addresses. Orders are normally despatched within 28 days, but please allow time for carriage.

The closing date for this offer is 12 March 1992.

(1)

**To: Practical Wireless Special Offer (March),**
**FREEPOST, Enefco House, The Quay, Poole, Dorset BH15 1PP**
**Please send me .....Sadelta MM-90 microphone(s) @ £39.95 each.**

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Charge to my Access/Visa Card the amount of £.....

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Valid from ..... to.....

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If you do not want to cut your copy of *PW* you **must** still send this corner flash as proof of purchase.

PW Publishing Ltd., Poole, Dorset (Reg. No. 1980539, England)

SPECIAL OFFER MARCH 1992

# BARGAIN BASEMENT

Write your advertisement in BLOCK CAPITALS - up to a maximum of 30 words plus 12 words for your address - and send it together with your payment of £2.35, and corner flash or subscriber dispatch label to: **Donna Vincent, *PW* Bargain Basement, Enefco House, The Quay, Poole, Dorset BH15 1PP.**

Subscribers must include the dispatch label bearing their address and subscription number to qualify for their free advert.

Advertisements from traders, apparent traders or for equipment that is illegal to possess, use or which cannot be licensed in the UK, will not be accepted.

No responsibility will be taken for errors.

**For Sale** Sony PRO-80 scanner with airband and 8-way tuning 150kHz-108MHz and 115-223MHz, case, earphone, manual, boxed, six months old, as new, £170. Tel: Cambridge (0954) 781140.

**Wanted**, Restoring R1155 and 19 set for Air Training Corps demonstration. Need cases, cables, control box. Any 6K8, 6K7, VR102 valves. Will collect any unwanted scrap units. Ken Jones G3PSZ, 24 Station Road, Okehampton, Devon EX20 1EA. Tel: (0837) 53021.

**Wanted** British Mk123 RX/TX with associated accessories. Tel: Norfolk (0366) 500867 evenings.

**For Sale** Kenwood 231E 144MHz 45W f.m. mobile, £180. Also 430MHz 431E matching mobile, £220. Both absolutely mint used base only. VGA monochrome monitor brand new, boxed, £50. P. Chamberlain G4XHF. (0293) 515201.

**For Sale** Yaesu FT-290RII 144MHz multi-mode boxed with rubber duck antenna, shoulder strap, NiCad charger, new NiCads (high power type), £350 o.n.o. Tel: Bedford (0234) 854899.

**For Sale** Drake R7, £450. Philips D2999 world receiver, £150. Icom IC-290H - 144MHz all-mode transceiver, £200. Sangean ATS 803A multi-band receiver, adaptor, earphones, £70. Tel: (0695) 28945.

**For Sale** Trio TS430s, c.w./s.s.b. filters, f.m., + PS430, + SP430, + MC60, + AT230, £850 o.n.o. MBA Morse/Baudot/ASCII reader, £90. Trio TW4000A dual bander, £295. Yaesu FT-221 144MHz multi-mode, + MDR, £215 o.n.o. GM0MGE QTHR. Tel: (0506) 416365.

**For Sale** TR751E 144MHz multi-mode, grid dip oscillator, wavemeter, s.w.r. meter. All perfect condition and little used. Going QRT, £500 the lot o.n.o. Dave, Lichfield, Staffs. Tel: (0543) 414078.

**Silent Key Sale** Racal RA17L communications receiver, £200 o.n.o. Lightweight headphones, low impedance, £5. BOBTAIL h.f. antenna with a.t.u., proven track record (VK, UA0, JA all on 6W). Bill G6WDF. Tel: (0869) 244798.

**Wanted** Yaesu FT-208R, immaculate, with speaker mic., charger, spare battery, soft case. Tel: (0492) 549977.

**Junk!** includes serial matrix printer, c.p.u. board ex laser printer, Z80s, 6809s, RAMS, PC interface boards, disc drives, Marconi valved scope (needs attention). Multimeters, audio p.c.b.s, record decks, tuners, components, CGA monitor, scrap TVs and videos etc,. Swap any condition h.f. kit, w.h.y. or simply take it away. Kevin Wheeler, Stoke-on-Trent. Tel: (0782) 410132.

**For Sale** Racal RA17 MkII with case, £195, another w/o case, £125. RA37 10-980kHz l.f. converter, £55. RA63 s.s.b. adapter, £60. RA180 servo-tuned r.f./mixer, £30. Pye Cat marine RX, 60kHz-31MHz, £30. Tel: Suffolk (0728) 860904 (answer phone before 8pm).

**Wanted** Pensioner wants Yaesu FRG-8800 converter, FRT-7700 tuner FRA-7700 antenna excellent condition, all manuals also Grundig Satellite 600 with manual, excellent condition Will collect within 30 miles, Coventry area. Tel: Coventry (0203) 679411 anytime.

**Wanted** Drake SPR4 or STR4 receiver. **For sale** Uher mobile stereo recorder with battery pack charger and leather carry case. Recent works service, manual. Tel: Cumbria (0229) 89635.

**For Sale** Icom R1 small hand-held receiver. 0.1-1300MHz no gaps. All usual high quality receiver functions. Unit is boxed with charger and user manual and is in mint condition, £260 o.n.o. Tel: Blackpool (0253) 826672 after 6pm or (0860) 440502 day.

**For Sale** Yaesu FT-7B mobile h.f transceiver 3.5-28MHz bands with manuals. 50W output s.s.b., 10W output a.m. No mod in anyway, £275. Tel: Birmingham 021-773 8110.

**For Sale** Trio 830s VFO230 AT230, £650 o.n.o. PK232MBX, £200. PacComm Tiny-2, £60 o.n.o. Microwave Modules MM1 144/100LS amp, £85 o.n.o. Trio 2300, £40. Prefer buyer collects. Tel: Dumbarton (0389) 841828.

**For Sale** Kenwood TS-520S transceiver plus AT-200 a.t.u., £375. Yaesu FRT-7700 receiver only, £35. All good condition, buyer collects, cash only. G3OJI QTHR (Nr Rugby). Tel: (0926) 812621.

**Wanted** DST100 receiver and/or spares for DST100. Also circuit diagrams for Knight signal generator KG686 and sweep generator KG687. Tom Bartlett G3ITB. Tel: (0508) 20657.

**For Sale** Yaesu FT-[illegible]1R 144MHz multi-mode, v.g.c., £290. [illegible]elequipment D43R oscilloscope an[illegible] manuals needs attention, £30. 30[illegible]b Miniscribe hard disk card for IBM XT etc. £80. Tel: Ware (0920) 821106.

**Wanted** Circuit diagram etc. for Imperial Continental 350 radio, circa 1956. Good photo-copy or original - reasonable price plus postage. Tel: (0787) 473136.

**For Sale** complete h.f station, Yaesu FT-101ZD/f.m./fan, FC 902 a.t.u., SP 901P speaker, Shure 444 mic, Marconi key, leads, manuals, all mint, £675 o.v.n.o. possible PX 286PC computer. Tel: Wirral 051-632 6250.

**For Sale** Icom 575H (100W model) 50MHz and 28MHz TX/RX mint, hardly used, all accessories, packing etc., £765. Panasonic KXP1180 printer with Centronics cable **brand new**, £80. Paul G4XHF. Tel: (0293) 515201 anytime.

**For Sale** Fremar/Raycom 144MHz thumb-wheel frequency control hand portable (IC2E?) with NiCad, charger, Icom HM-9 SP/mic and Icom DC1 12V adaptor for mobile/base, six months old, boxed £110. G7KXX. Tel: (0922) 57136.

**For Sale** Yaesu FT-290R with MuTek front end, mobile bracket, NiCads, book, £230. Daiwa mast-head pre-amp with in-built lin-amp, £25. Brother word-processor used eight times cost £512 accept, £275. Tel: Chesterfield (0246) 452169 anytime.

**For Sale** *QST* 1989 to 1991 you pay post and packing, offers? G2DRT QTHR. Tel: (0494) 814240 between 6pm-10pm.

**For Sale** Uniden 2830 28MHz multi-mode transceiver digital readout, 30W output scanning mike, box and instructions. Immaculate condition, £240 o.n.o. Tel: 021-745 8222.

**Wanted** Loan or buy info, circuit diagram, manual, etc., on advance electronics oscilloscope,OS15. George G4OTM. Tel: Oldham 061-678 0684 anytime.

**For Sale** Dressler ARA 30 active antenna 50kHz to 40MHz. Complete with interface and p.s.u. as new, £80 o.n.o. Nick G7IYG. Tel: Uxbridge (0895) 236397.

**Wanted** 7in reel-to-reel tape recorder, any make considered, but preferably Sony, Trio, or Teac. Andy Frew, Fox Hollow, High Street, New Galloway, Castle Douglas, Kirkcudbrightshire. Tel: (0644) 2323.

**For Sale** Trio 9130 multi-mode transceiver BO-9A system base unit seven amp power supply, gutter mount quarter wave antenna and mobile mount, £325 o.n.o. G7ASV. Tel: Walsall (0922) 25770 after 6pm.

**For Sale** I have a collection of wartime miniature components, valves, resistors, capacitors, variables, etc., an old transmitter and other parts. If you are interested call Eric Ward on (0823) 400762.

**For Sale** Global Coupler ATU-1000, £45. ERA BP34 audio filter, £55. Datong active antenna, AD 270, £40. Sony cassette-corder stereo. New, unused, boxed, cost £200 accept £120. Ray. Tel: (0282) 842124.

**For Sale** Icom R7000 receiver with h.f. upgrade. Immaculate, boxed as new, complete with Discone and Datong active antenna plus external speaker, £650. Mr Barker, Hull. Tel: (0482) 654307.

**Wanted** any information on Tektronix oscilloscope type 585 and especially Tektronix type 82 dual trace plug-in unit please. Dave, Crawley. Tel: (0293) 883510.

**Wanted** For Ekco transistor radio model A455. 1 - i.f. module unit LP1156. 2 - AF115 transistors. 2 - AF117 transistors. Reg Bolton G14BBE, 5 Mourneview Park, Kilkeel, Co. Down, Northern Ireland BT34 4NB. Tel: (0693) 764498.

**For Sale** Kantronics KPC 4 dual port TNC including leads and manuals plus PC programs. Boxed and in good condition with version 3. O2D Eprom featuring open squelch DCD etc, £175 + p&p o.n.o. Jerry GOCUO, QTHR. Tel: Tyneside 091-410 0330.

**For Sale** Yaesu 7000, plus Mk II microreader also computer screen, plus keyboard, £300. Tel: (0444) 482334.

**For Sale** Fairmate HP2000 hand-held scanner, boxed new, two antennas, recharger, NiCads, mains adapter, leather case, SKYscan magmount, 10 month guarantee Plus *The Complete VHF/UHF Frequency Guide* book latest edition. Frequency range 500kHz to 1.3Ghz, £199. Mr Kin Wing Wu, Cardiff. Tel: (0443) 685354.

**For Sale** Standard C528 dual-band hand-held, excellent, coverage, soft case and boxed, eight months old, £275. Tel: Cumbria (0931) 6581.

**For Sale** Kenwood TS130SE h.f. TX/RX 100W mint, £375. Kenwood TM702A dual-bander (NOTE: No u.h.f. repeater shift) new, £245. Alinco DJ-F1T handie (No repeater 1750Hz) new, £140. G0MWH. Norwich. Tel: (0603) 627389.

**For Sale** Early Valves; VP4B, SP4 (2), MS4B, TDD2A, ACO44, PM12M (2), VP4, VP2b (2), MU14, TDD4, 6A7, 42, 6U7GM, 6F7B, EBC3. All boxed, some with original instructions and guarantee, offers? **Wanted** 144MHz s.s.b. transceiver (multi-mode considered if price right). Roy G7CQD QTHR, Bromyard. Tel: (0885) 483233.

**For Sale** FT-747 plus f.m. used twice, £550. FTDX400, £55. FRDX400, £55. or both £100. FT-102 h.f. TX/RX immaculate, £500. G4MH mini h.f. beam, £50. All g.w.o./o.n.o. Mr Limehouse G3WTN, 4 Sandford Close, Kingsclere, Nr. Newbury, Berkshire. Tel: (0635) 299146.

**Wanted** Codar multi-band 6 receiver, reasonable price. E. Rowe, 11 Thorstone Drive, Irby, Wirral, Merseyside L61 4XR.

**For Sale** Tektronik 545a scope with L type plug-in. Scope re-valved, full workshop manual, £50. Buyer collects. Mr N. Platts, 44 Northfield Road, Tetbury, Glos GL8 8HE. Tel: (0666) 502067.

**For Sale** PC Akhter, DFK 700UK. 40 M Bytes, hard disk. Sidekick ver 1.56A programme inserted. Panasonic professional printer KX-P1592 multi-mode. All in mint condition, very little use cost £800, accept £400 o.n.o. Ray. Tel:

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| EF55 | 3.50 |
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| PY81 | 1.50 |
| PY82 | 1.50 |
| PY83 | 1.50 |
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| PY500A | 4.00 |
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| UABC80 | 1.50 |
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| UCL82 | 2.00 |
| UCL83 | 3.00 |
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| 6BE6 | 1.50 |
| 6BH6 | 2.50 |
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| 807 | 5.00 |
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| 5814A | 4.00 |
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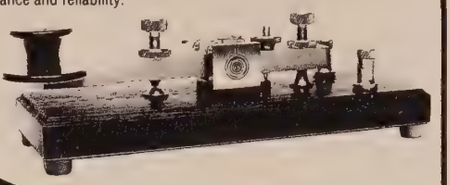

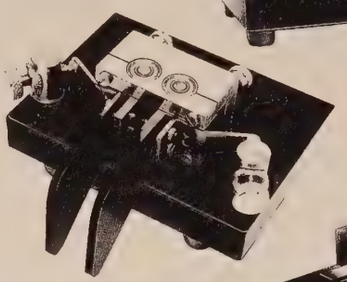

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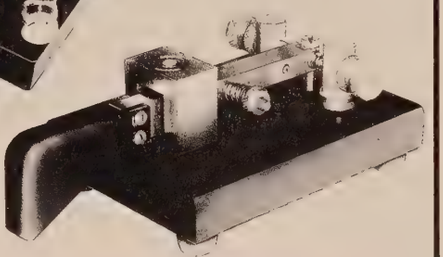

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## YAESU

| | | | |
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| FT1000 | HF Transceiver | 2995.00 | (15.00) |
| FT990 | NEW HF Transceiver | P.O.A. | |
| FT767 | HF Transceiver | 1599.00 | (10.00) |
| FEX767(2) | 2m Module (767) | 182.89 | (4.00) |
| FEX767(70) | 70cm Module (767) | 229.89 | (4.00) |
| FEX767(6) | 6m Module (767) | 182.89 | (4.00) |
| SP767 | Speaker | 71.47 | (4.00) |
| FT747GX | Budget HF Transceiver | 659.00 | (10.00) |
| FT757GX | Mkll HF Transceiver | 1000.00 | (10.00) |
| FP700 | 20A P.S.U. | 223.75 | (6.00) |
| FC700 | Manual ATU | 152.24 | (6.00) |
| FP757HD | Heavy Duty 2m P.S.U. | 264.37 | (6.00) |
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| FT5200 | 2m/70cm Dual Band FM Mobile | 539.00 | (10.00) |
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| FT690MkII | Mkll 6m M/Mode 2.5W | 429.00 | (6.00) |
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| FL6020 | 6m 10W Linear | 111.37 | (3.00) |
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| YHA44D | 70cm ½ wave | 12.77 | (2.50) |
| MMB15 | Mobile Bracket | 14.55 | (2.50) |
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| FL7025 | 70cm 25m Linear for above | 142.02 | (4.00) |
| FT26 | NEW 2m H/Held | P.O.A. | |
| FT76 | NEW 70cm H/Held | P.O.A. | |
| FNB9 | Nicad Battery Pack (23/73) | 29.39 | (2.50) |
| FNB10 | Nicad Battery Pack (23/73) | 35.25 | (2.50) |
| FNB11 | Nicad Battery Pack (23/73) | 69.33 | (2.50) |
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| SMC28 | Charger (23/73) 13A Plug | 18.09 | (2.50) |
| NC28 | Charger (23/73) | 18.09 | (2.50) |
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| MH18A2B | Speaker Mic Miniature (23/73/727) | 31.73 | (2.50) |
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| YH55 | Padded phones | 20.42 | (3.00) |
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### Antennas

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| D130 | 26-1300MHz Discone | 76.65 | (6.00) |
| Jaybeam | TB3 Mkll 3e HF Tribander | 403.10 | (10.00) |
| Creative | CD318 JR 4e HF Tribander | 305.00 | (10.00) |
| Creative | CD318 4e HF Tribander | 357.00 | (10.00) |
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| WX2 | 2m/70cm Base Fibre Glass | 76.65 | (6.00) |
| WX4 | 2m/70cm Base Fibre Glass | 101.16 | (6.00) |
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| HK 707 | | 27.00 | (4.00) |
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| Oscar 1718 | 3.5-150MHz | 27.45 | (4.00) |
| Yaesu Y560 | 1.6-60MHz | 95.00 | (3.00) |
| Yaesu YS500 | 140-525MHz | 83.00 | (3.00) |
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| Comet CD120 | 1.8-200MHz | 76.60 | (4.00) |
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| Comet CSW20 | SO239 switch | 27.50 | (4.00) |
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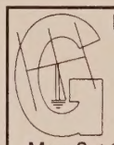

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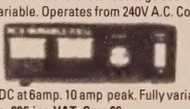

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| **Kenwood VC-20** | VHF converter for R-5000 | **£167.00** |
| **Yaesu FRG8800** | Fine performing all mode set | **£640.00** |
| **Yaesu FRV-8800** | VHF converter for above | **£100.00** |
| **Icom IC-R71E** | The old favourite | **£855.00** |
| **Icom IC-R72E** | Icom's latest, small & excellent | **£645.00** |
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| **JRC-535** | The latest from Japan Radio Company | **£1095.00** |
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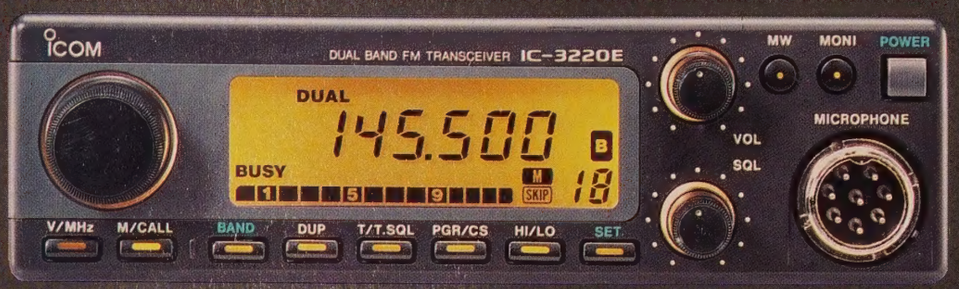
## IC-970E/H
Multi band all mode transceiver

- All mode operation on 144, 430, 1200 and 2400MHz bands.
- Optional 50~905MHz receiver unit.
- Satellite operation mode.
- Sophisticated DDS system.
- Dual band watch.
- 425(w)x149(H)x406(D) mm.

## IC-W2E
144/430MHz Dual band FM transceiver.

- Receives 2 band signals at once.
- Versatile high-speed scan.
- Pager and code squelch for selective calling.
- 54(W)x154(H)x36(D)mm.




## IC-3220E/H
144/430MHz Dual band FM transceiver.

- Simple dual band operation.
- Receives 2 band signals simultaneously.
- Full duplex QSO.
- 140(W)x40(H)x195(D)mm.

## IC-2410E/H
144/430MHz Dual band FM transceiver.

- Simultaneously receives 2 frequencies on one band.
- Remote control capability (with HM-56 and UT-55).
- Large dual band display.
- 140(W)x40(H)x174(D)mm.

Photograph shows U.S.A. version

For further information about ICOM products and your nearest authorised dealer please contact:
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